Journal
OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

AVMA Convention—Cleveland, August 19-22, 1957

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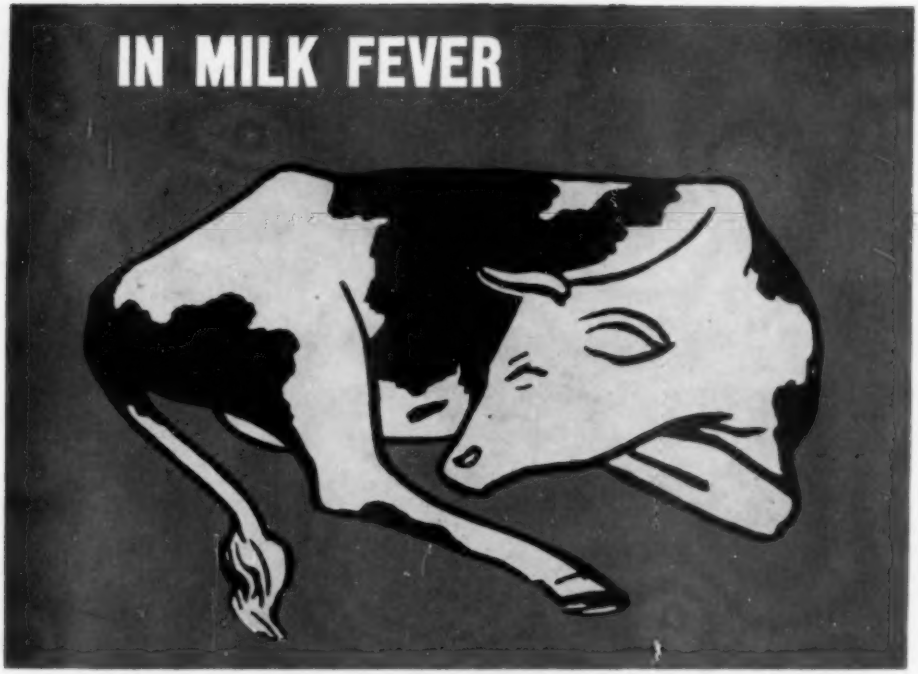

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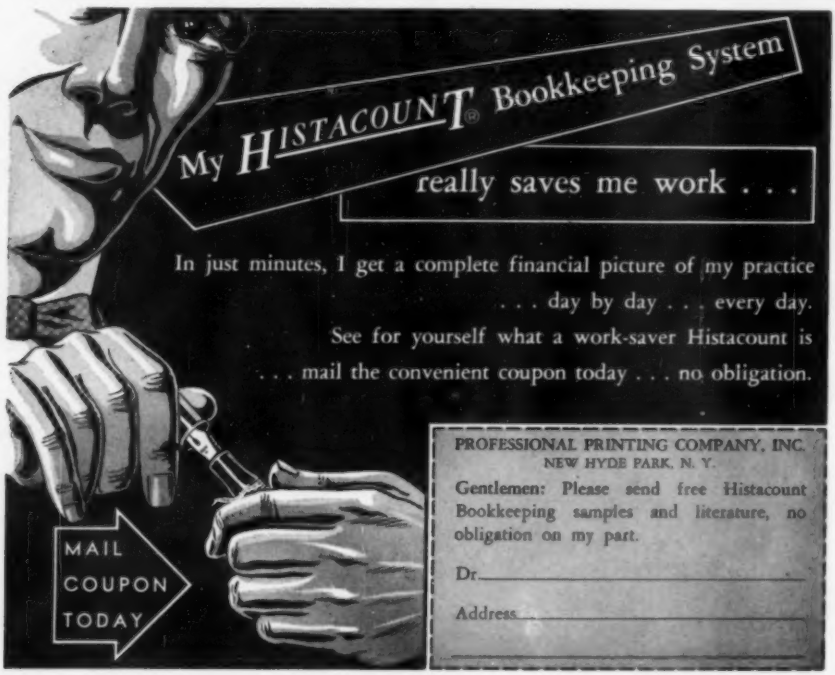
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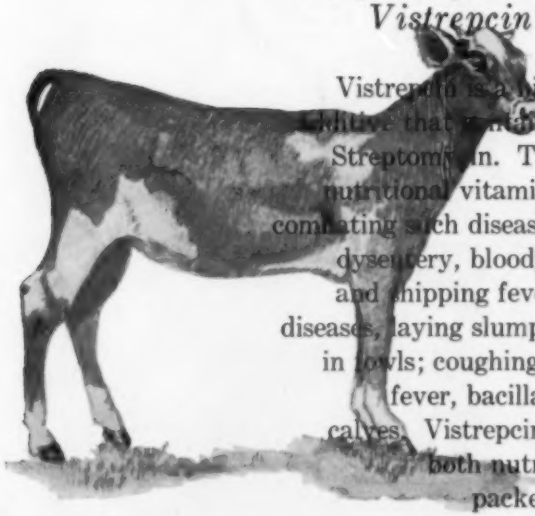

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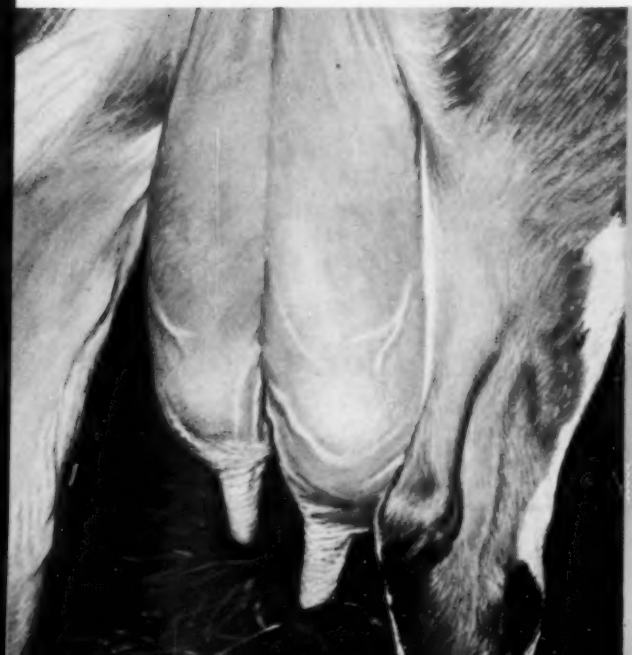

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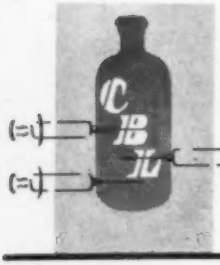

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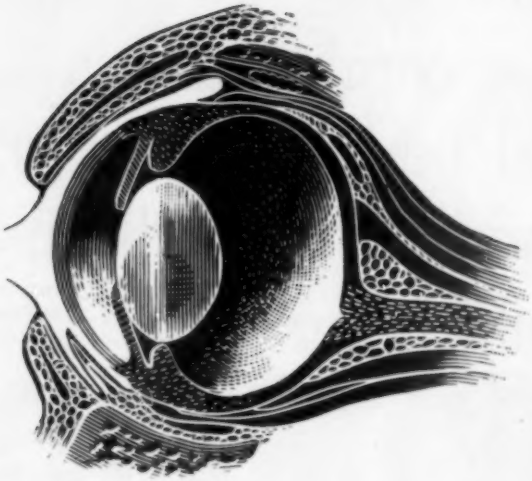

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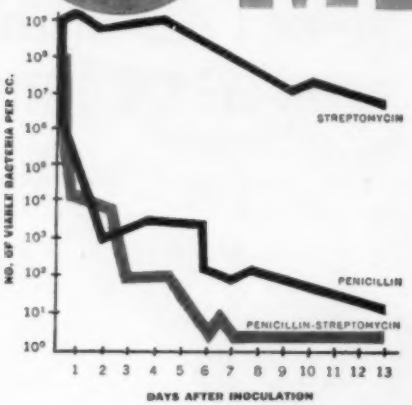

This graph presents the combined, synergistic antibacterial action of penicillin and streptomycin on a culture of *Streptococcus liquefaciens* (strain L. W.).[2]

1. Welch, H.: Antibiotic Med. & Clin. Therapy *3*:375 (Nov.) 1956. 2. Adapted from Hunter, T. H.: J.A.M.A. *144*:524 (Oct. 14) 1950.

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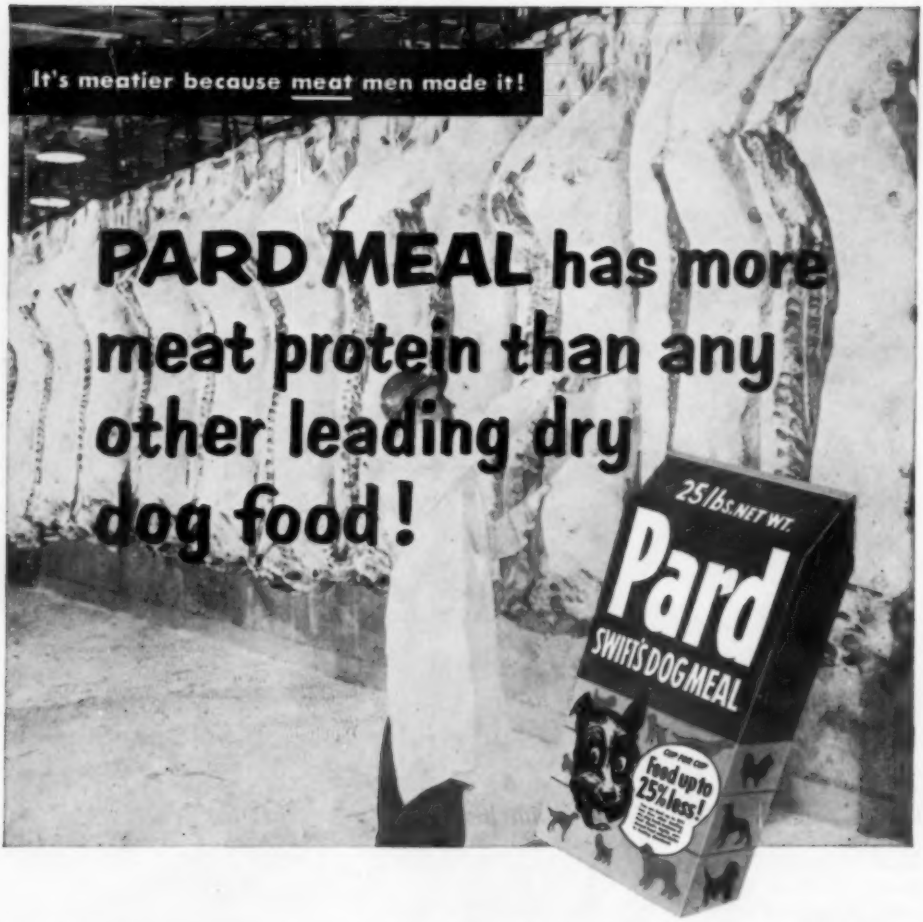
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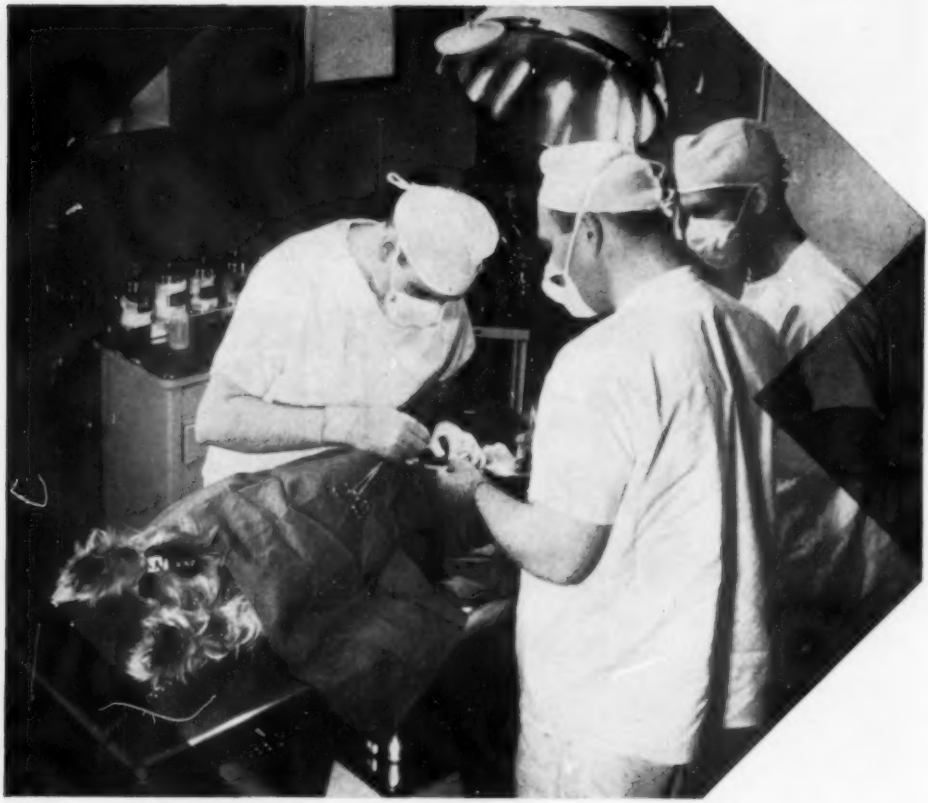

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News From Washington

The following legislation of interest to our profession was introduced in the 85th Congress, shortly after convening:

Brucellosis Eradication Program—H.R. 294 and H.R. 297 by Rep. Melvin R. Laird (R., Wis.) would amend the Agricultural Acts of 1949 and 1954 to authorize the use of $20 million of Commodity Credit Corporation funds for fiscal year 1959. (Present authority extends only through fiscal year 1958. See JOURNAL, Sept. 15, 1956: adv. p. 8).

Compulsory Poultry Inspection—H.R. 12, 377, 514, 767, 899, 1964, and 3052 introduced respectively by Rep. Leonor K. Sullivan (D., Mo.), Rep. James G. Polk (D., Ohio), Rep. Thomas G. Abernethy (D., Miss.), Rep. Clifford G. McIntire (R., Maine), Rep. Melvin Price (D., Ill.), Rep. Edward T. Miller (R., Md.), Rep. Charles B. Hoeven (R., Iowa). H.R. 12 differs from the other bills in that it would amend the Meat Inspection Act, while H.R. 899 would create a poultry section in the Meat Inspection Branch. Senate Bill 645 was introduced by Senator Herman E. Talmadge (Ga.) for himself and Senators Russell (Ga.), Eastland (Miss.), Sparkman (Ala.), Stennis (Miss.), all Democrats, and Senator Young (R., N. Dak.).

Require Humane Methods in Slaughter of Livestock and Poultry—H.R. 176, 2880, 3029, 3049; introduced respectively by Rep. Martha W. Griffiths (D. Mich.), Rep. George P. Miller (D., Calif.), Rep. William A. Dawson R., Utah), and Rep. Edgar W. Hiestand (R., Calif.).

Senator Edward J. Thye (R., Minn.) introduced S. 673, a bill that would increase the authority of the Secretary of Agriculture to prevent the further spread of communicable diseases of livestock and poultry.

Tax Deferrments—H.R. 9 introduced by Rep. Thomas A. Jenkins (R., Ohio) and H.R. 10 by Rep. Eugene J. Keogh (D., N.Y.) are identical bills that would permit self-employed, including veterinarians, to annually deduct from adjusted gross income not to exceed 10 per cent of net earnings or $5,000, whichever is the lesser, when paid into retirement funds. Total set aside during a taxpayer's lifetime could not exceed $100,000.

Civil Service Retirement—P.L. 854, 84th Congress, among other benefits, increased the annuity of those retiring **on or after Oct. 1, 1956.** Numerous bills have been introduced to provide certain increases for those who retired prior to Oct. 1, 1956. Some of these are: H.R. 4, 97, 98, 158, 169, 943, 2411, and S. 618. Many veterinarians on the Civil Service retired list would benefit.

Social Security—Several bills would amend the subject Act to permit individuals entitled to benefits to earn more outside income than now authorized without deduction from their benefits. Among these are: H.R. 321, 372, 493, 529. H.R. 321 would also increase minimum benefits and reduce the age to 60 at which benefits become payable. Another bill, H.R. 240, would provide full benefits under the Act at age 62.

U.S.D.A. budget, submitted to the Congress by the President, included $56,910,000 for all research in ARS; some of the research included in this figure is: animal disease and parasite branch, $3,294,900; plant and animal disease and pest control, $26,952,000; meat inspection, $18,718,000; and Plum Island, $3,640,000.

* * * *

Revocation of Army orders on 20 veterinary officers was reconsidered; 19 of them went on active duty on or about January 20, one declined. After inquiries from some Congressmen on behalf of their constituents, the Army evidently determined that too great hardship had been inflicted on those affected; many had sold household goods, given up positions, and had purchased uniforms following receipt of their initial duty orders.

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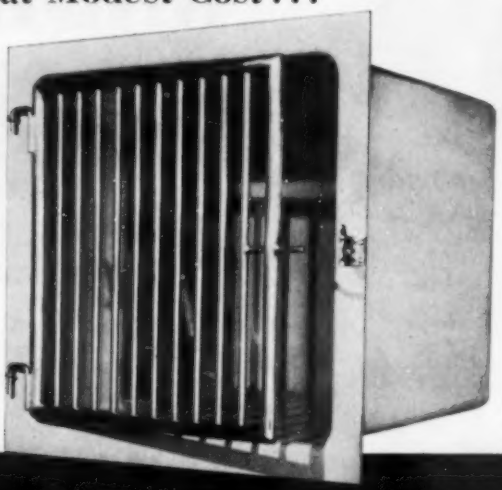

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Puppy Production to the Weaning Age

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THIS REPORT deals with 234 consecutive litters whelped in a Beagle-breeding colony over a four-year period. In 1951, this colony was established at the School of Veterinary Medicine, University of California, Davis, to supply experimental dogs for longevity studies. The kennel design and care of the experimental dogs used for these studies have been described in a previous report.[1]

It is known that reproduction capability in animals, as in man, varies with age: Early growth is characterized by infertility; adolescence, maturity, and early senility are periods of fertility; and as aging progresses, the ability to reproduce decreases to relative or complete infertility. The present study includes a correlation between age and reproductive capacity in the Beagle breed, as well as a determination of the age at which the dam reaches her peak of efficiency.

MATERIALS AND METHODS

From June, 1951, to April, 1952, 80 female and 7 male Beagles were obtained from various kennels and individual owners over a wide area of the United States. These dogs represented most of the variations seen within the standards of the Beagle breed.[2] All of these dogs were kept in isolation for two to four months before being placed in the breeding colony. During this time, 15 females and 1 male were culled because of ill behavior, disease, parasites, or anomalies. The remaining 76 dogs (70 females and 6 males) were tattooed on the right ear and flank with a breeding number, vaccinated with avianized distemper vaccine, and placed on the kennel site. This group averaged 4 years of age when assembled as a breeding colony. A complete history could not be obtained for the purchased breeding stock. Consequently, it was necessary to maintain these dogs for one to two years to establish their reproductive capabilities. As records became available, the poorest producing dams were culled and replaced by progeny from the breeding stock.

Bred females were placed in pens to whelp and raise their litters to the weaning age. These breeding colony pens (fig. 1) were 10 by 20 ft. in size, and were equipped with a whelping house, running water, and feed pan. The whelping house was made from an oak barrel (132-gal. capacity) mounted on a 2- by 6-inch redwood frame. Spanish puncheon-style barrels were selected because of their large center diameter and narrow ends. One end of the barrel was removed to provide an entrance. A 3-ft.-wide redwood top and front was placed on the barrel, leaving a 12-inch passageway

Fig. 1—Each whelping pen was supplied with a whelping house constructed from a puncheon barrel (132-gal. capacity) mounted on a frame with a redwood top and an entrance. Within each barrel was a subfloor and a 100-watt electric light bulb.

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as an entrance. This type of house gave protection from the weather, as well as seclusion for whelping. The barrels were sprayed inside with boiled linseed oil diluted with equal parts of paint thinner. The outside of the barrels and the redwood tops were tinted with aluminum pigment. In addition, each whelping house was provided with a 100-watt electric light bulb to supply warmth during the winter.

Water was brought into the pens by an underground line from which a hose bib was placed high enough above the ground to allow a 6-qt. pail to swing freely. The pens were surfaced with 6 to 8 inches of gravel topped with 1 to 2 inches of ¼-inch crushed rock and were surrounded by 5-foot-high, galvanized, cyclone-style fencing. A 6- by 8-inch concrete gutter below the fence limited the spread of gravel between pens and prevented the possible escape of the dogs.

The following ration was fed in combination with fresh frozen beef during this study:

Ingredients	Per cent
Meat scraps, good quality	41.0
Toasted grain flakes	34.0
Fish meal	6.0
Soybean meal, toasted	6.0
Tomato pulp	3.0
Alfalfa meal	1.5
Blood meal	1.5
Liver meal	1.5
Dehydrated milk	1.0
Dried whole eggs	0.5
Salt	0.5
Vitamin mixture	3.5

A-500,000 U.S.P. microtized crystals; B-complex, 50 mg. each of thiamin, riboflavin, pantothenic acid, niacin; D-5,000 U.S.P. units, irradiated yeast source.

This ration was compounded twice weekly and stored in metal containers. Before feeding, the ration was mixed with warm water to the desired consistency in a concrete mixer. Enough was fed, once daily, so that a small amount was always left in the feed pan. Once weekly, 1 to 2 lb. of fresh-frozen beef was substituted for the ration. Beef cheek, heart, and oxtail, obtained from local abattoirs, were packaged, frozen, and thawed before feeding. Dogs in whelp or lactation received an additional feeding of equal parts ration and chopped beef.

After each daily feeding, a caretaker entered the pen to observe the dogs, remove excreta, refill the water pail, replace the feed pan on the fence, and tidy the pen. The kennel foreman observed the dogs daily for evidence of estrus. In addition, each dog was examined twice monthly by the veterinarian. This examination included body weight, general condition, stage of estrous cycle, and evidence of abnormalities. Dogs were observed several times on the day of whelping, and lactating dams were inspected at least twice daily. Any nonviable pups were promptly removed from the pen without undue disturbance to the dam or litter.

A number of subclinical examinations were made. Semimonthly, fecal specimens were taken from each pen and examined for parasites by the sugar-flotation method. Blood examinations were made at six-month intervals, using standard hematological techniques. Blood samples were also examined at least twice for evidence of microfilaria, Leptospira, and Brucella. Three of the purchased dogs were positive for microfilaria and were later replaced in the breeding colony. Five dogs which showed positive titers for *Leptospira canicola* were not culled since clinical signs of the disease were not apparent. The dogs were negative for *Leptospira icterohaemorrhagiae*, and all serological examinations revealed the absence of titers for *Brucella abortus*, *Brucella suis*, and *Brucella melitensis*.

Data from the breeding colony were recorded in individual files for each dog.

Breeding and Whelping

Stud dogs were assigned individual pens. Females were kept in pairs until signs of proestrus became evident. When a female showed vulvar enlargement as evidence of proestrus, she was brought to a male on alternate days for breeding. Usually, the female in proestrus entered into sexual play with the male. If a female or male showed no sexual interest, the female was placed with a different male. Females bred for the first time were held by an attendant throughout the breeding procedure. This was a precautionary measure against damage to the sexual organs. A successful mating was characterized by the so-called "tie" which lasted about 20 minutes. Two days after the first mating, the female was returned to the same male for a second breeding. This practice is in keeping with the observation[3] that the highest fertility occurs when the female is bred during the first four days of estrus. A definite recession in sexual desire on the part of the female was also observed[4] after the third day of estrus, although copulation was permitted at a later day in the cycle.

While the breeding colony was being established, the adage "familiarity breeds contempt" seemed to hold true in the breeding procedure. At first, as a daily routine, females in various stages of the estrous cycle were left with the males for several hours at a time. This resulted in conception failures, although the females in estrus were observed assuming the breeding position. In other words, sexual desire was not aroused in the males when they were allowed continuous association with females in proestrus and estrus. The males still failed to show sexual stimulation after they were given increased quantities of

meat, injections of vitamin B complex, and aphrodisiacs. After the males failed to respond to several females "in season," an outside male was brought into the breeding colony. This male shortly bred 1 female but, more important, he created a commotion among the stud dogs in the colony. Within the next few days, the studs in the colony bred all of the females in estrus. Such an episode was not again experienced since the female to be bred was left with the male for a limited time only, usually no longer than 30 to 60 minutes.

A stud dog was not allowed to breed more than 2 females a week. He was replaced at 6 years of age or when he had sired three consecutive litters that averaged less than 4.5 pups.

Clean rags or burlap sacks were placed in the whelping house before the whelping date was due. Dogs in whelp were not assisted by either mechanical means or drugs. This practice resulted in six deaths from dystocia during the first year of operating the breeding colony. Since then, dystocia has not been a major cause of death. Pup losses associated with this condition are discussed later in this report.

Most dams complete whelping within six hours but with some it is 24 hours or longer from the onset of labor until the litter is delivered. Usually, the dam approaching term becomes restless, starts panting, seeks a secluded place, and shows signs of nesting. Once these signs become evident and labor occurs, the female rarely changes the selected site for delivery. About half the litters produced during this study were born under the whelping house, though efforts were made to encourage whelping within the barrels by introducing modifications. For example, the curved bottoms of the barrels were made flat by wood or concrete; sawdust, paper, hay, straw, loam, and clean rags were supplied as nesting material. None of these changes, however, increased the number of litters whelped within the barrels. Apparently, the dam about to whelp is more concerned with intrusion by other dogs than with pen design. For instance, the fence between five pens in the breeding colony was covered with boards and aluminum sheets to form a solid partition between pens. Ten litters were whelped in these pens and the pup losses were compared with those from litters whelped in pens separated only by wire; losses were comparable in both types of pens. The necessity of providing security against intrusion by other dogs, which is recognized among dog breeders, was provided by not putting new dogs into adjacent pens.

Pups are normally delivered in a definite pattern. After the female has selected the site for delivery, she makes a nest about 2 ft. in diameter and 1 to several inches in depth, depending upon the individual. Once the nest is completed, labor begins. Labor is characterized by rhythmic uterine and abdominal contractions and the periodic expulsion of a fetus. During this process, the dam moves around the perimeter of the nest, stopping only to free the delivered pup from the fetal membranes, which she normally ingests.

The time of day when whelping occurs varies with the season of the year. During the colder months, it is usually in the late afternoon and, in the warmer months, in the early morning. Pup losses do not seem to be correlated with the time of day when a litter is delivered—that is, they are comparable in litters whelped during the night or daylight hours.

The use of medicinal treatment on the dam or pups was avoided during this study. Symptoms of puerperal septicemia[5] or of difficulties related to pregnancy and whelping[6] were not observed.

LACTATION AND WEANING

Lactating dams were fed morning and night until the litter was 33 days old. On the thirty-third day, the pups were offered a small quantity of freshly ground beef, about 1 oz. each, and the dam was returned to the routine feeding schedule of one daily meal. Thereafter, the litter was fed equal quantities of ration and ground beef. After the litter had received this feeding for three to five days, the dam was permanently separated from it.

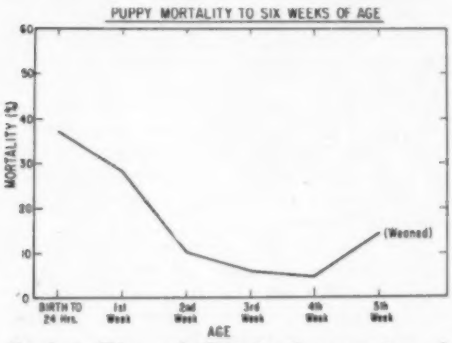
During weaning, it was necessary to keep the dam from eating food intended for the pups. The sudden decrease in the quantity of food given the dam initiated mammary involution and most lactating dams responded to this reduction in ration; however, a few uneventful cases of congested or "caked-udder" were observed. These responded to a brief nursing period or to the application of alternate hot and cold packs.

Signs of puerperal tetany (eclampsia)[7] were not observed in this study.

DISCUSSION

The findings of this investigation suggest that the basic problems related to puppy production can best be solved by prevention rather than cure.

The successful raising of the pup to the weaning age is largely the concern of the dam. After a fetus has been expelled, the



Graph 1—This graph illustrates the percentage of pup mortality to 6 weeks of age.

responsibility of survival is gradually, but increasingly, assumed by the pup which, during the nursing period, is preparing for an independent existence. It is during the transitional changes, occurring at birth and again at weaning, that high losses of young are found in most species of animals. For instance, it was found[7] that 20 per cent of the mortality in pigs occurred largely during the first 72 hours after birth. In man, the high mortality occurring during the first year of life is not again approached until the sixty-eighth year.[8] It was observed[9] that 82 per cent of pup losses occurred during the first week of life. In this study of 1,157 pups whelped during a four-year period, 340 (29.4%) died under 6 weeks of age. The losses in relation to the time after whelping (graph 1) were highest during or shortly after birth. Following birth, there is a marked decrease in mortality to 4 weeks of age, with a rise at the weaning age.

TABLE 1—Puppy Losses to 6 Weeks of Age

Causes of death*	Birth		Age (weeks)†				
	Male	Female	1	2	3	4	5
Malformations							
Fissure (abdominal-thoracic)	6	....	....	....	....	....	....
Adactylia	1	3	7	....	....	....	....
Facial cleft	....	....	8	....	....	....	....
Rectal prolapse	....	....	2	1	....	....	....
Mummified fetus	2	....	....	....	....	....	....
Stillbirth	30	23	....	....	....	....	....
Dams default							
Dystocia	14	13	....	....	....	....	....
Trauma (carelessness)	10	8	20	7	1	....	....
Excessive licking	....	....	9	....	....	....	....
Lactation failure	....	....	12	....	....	....	....
Cannibalism	....	4	1	4	2	....	....
Weak pups(runts)	....	....	8	5	....	3	....
Exposure (heat and cold)	....	....	9	11	13	2	16
Disease	....	....	6	1	3	4	15
Parasites	....	....	....	....	....	4	5
Accidents	....	....	4	5	2	2	7
Undetermined	5	7	10	....	....	1	5
Subtotal	68	58	96	34	21	16	48
Percent of total	37.0		28.1	10.0	6.1	4.7	14.1

*See text for explanation. †Consecutive litters, 234.

The causes of pup losses to the weaning age are numerous. Necropsies and other studies, made to determine causes of pup mortalities, are reported (table 1). Stillbirth, which accounted for the highest losses at birth, included all pups that were nonviable at the time of delivery (15.6%). Dystocia accounted for the 7.9 per cent loss of all viable pups which died shortly after delivery. Trauma or crushing ranked next in importance as a cause of neonatal deaths. These combined causes accounted for more than one third (37%) of the pup losses to weaning age.

Some of the causes of neonatal death are described in textbooks, but such factors as disease, nutrition, and kennel management are not fully treated.[10-12] Such diseases as infectious canine hepatitis, brucellosis, and toxoplasmosis have been reported[13-15] to affect the viability of young at birth. Sound nutrition is essential to the successful raising of puppies.[16] The low incidence of disease in this kennel and an adequate nutritional regimen[17,18] made it difficult to explain disease or nutrition as responsible for the high neonatal losses shown in table 1. The kennel management of this colony has been practical, and special care, pampering, or the use of medicinal agents has been purposely avoided in order to obtain basic information concerning the natural incidence of pup mortality.

Reproduction Statistics.—During the first year of this study, it was observed that dams over 3 years of age did not reproduce as efficiently as younger dams. It is well known that a peak in fertility is reached at a definite age during the life span of all species. Women reach their climax in fecundity at about the age of 25.[19] Infant mortality is at a minimum in women between 25 and 29 years of age and pro-

TABLE 2—Puppy Mortality in Relation to the Age of the Dam

Age of dam (yr.)	No. of litters	Pups whelped		Sex ratio (%)	Pups whelped per litter	Pups weaned		Sex ratio (%)	Pups weaned per litter	Mortality (%)
		Male	Female			Male	Female			
1	71	188	169	52.7	5.03	137	124	52.5	3.68	26.9
2	57	160	132	54.7	5.12	118	101	53.9	3.84	25.0
3	31	76	78	49.4	4.97	61	61	50.0	3.94	20.8
4	17	38	34	52.8	4.24	24	26	48.0	2.94	30.6
5	18	39	55	41.5	5.22	22	32	40.7	2.88	42.6
6	17	38	40	48.7	4.59	28	27	50.9	3.24	32.1
7	11	26	32	44.8	5.27	12	18	40.0	2.73	48.3
8	6	12	19	38.7	5.17	3	11	21.4	2.33	54.8
9	3	4	6	40.0	3.33	2	5	28.5	2.33	30.0
10	3	3	8	27.2	3.67	3	2	60.0	1.67	54.5
Subtotal	....	584	573	.....	.....	410	407	.....	.....	.....
Total (av.)	234*	1157		50.5	4.95	817		50.2	3.49	29.4

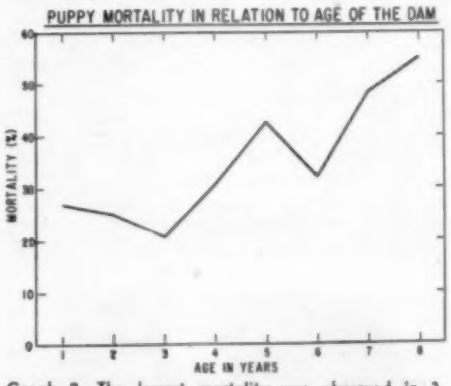
*Consecutive litters.

gressively rises with advancing age of the mother.[20] From a reproductive standpoint, women are fully mature between 25 and 29 years of age.[21] Hence, in the human being there is a definite correlation between fertility, infant mortality, and maturity. Similar data are avilable for the ewe and sow which reach maturity between 3 and 4 years of age[22] and for beef cattle which mature at 6 years of age.[23] What about the dog in relation to maturity and reproductive performance?

A preliminary evaluation of the Beagle's reproductive performance is presented (table 2).* Such an evaluation of reproduction can be obtained by determining the percentage of nonsurvivals, *i.e.*, a mortality evaluation. The number of litters gradually decreased as the age of the dam increased. This is largely explained by the increased interval between estrous cycles, as well as a lower conception rate in dams over 4 years old. At this age and older, the estrous cycle is prolonged from the normal six-month interval to eight or more months. Female Beagles over 11 years old often continue in anestrus. In this colony, 5 dogs over 11 years old continued in anestrus for one and one-half years or longer. On necropsy, these dogs revealed enlarged, sclerotic, and cystic ovaries; all cysts were atretic follicles. In discussing the dog, Marshall[24] states, "It has also been noted that the recurrence of the sexual season tends to become irregular with advancing age, whether or not the animal is permitted to become pregnant." Others[25] have reported a low conception rate or lack of conception in the aged dog.

In this breeding colony, dams over 4 years old failed to conceive in one out of three breedings. Thus, failure to conceive

*Statistical analyses are in progress.



Graph 2—The lowest mortality was observed in 3-year-old dams. Poor-producing dams were culled from the colony at 5 years of age. This resulted in a marked decrease in pup losses; however, even the better-producing dogs showed a marked rise in losses with advancing age.

and the extended anestrus period of older dams helped to explain the decrease in litters shown in table 2. These data can, however, be used only to exemplify the trend in decreased production because, for economic reasons, poor-producing females were culled and replaced in the colony after being maintained for two years to establish breeding records.

The 3-year-old female Beagle excelled dams of all other ages in reproduction (table 2). In brief, at this age, the dam showed high fecundity with low pup mortality. Is it possible that a large number of losses at birth and to weaning age are directly related to the age of the dam?

Pup Mortality.—To visualize more clearly the data shown in table 2, a mortality curve of puppy losses to the weaning age in relation to the age of the dam was drawn

(graph 2). This graph shows a gradual decrease in pup mortality as dams approach 3 years of age. Pup mortality is lowest (20%) with the 3-year-old dam; thereafter, losses increase progressively, with the advancing age of the dam, with a marked decrease in losses in dams between 5 and 6 years of age. This sudden decrease in pup mortality is explained by the poorer-producing dams being culled at 5 years of age. However, the curve (graph 2) again rises markedly with the advancing age, even with selected dams. The mortality in an occasional litter from an older female may be relatively low in relation to this graph. Although they were an exception, three such litters from 9-year-old dams are recorded in table 2. In these three litters, pup mortality was only 30 per cent, but the litters were small (3.33 pups), indicating a decrease in fecundity.

Apparently a 3-year-old dam is in her prime. She is highly fecund and puppy mortality is low (graph 2); furthermore, she is an "easy-whelper." At this age, she spends a minimum amount of time preparing for the actual delivery of her litter and weans the greatest number of pups. Observations indicate that any delay in whelping is critical to the viability of the newborn pup. The inexperienced young female (1 to 2 years old) tends to delay delivery by spending several hours "nesting" or preparing to whelp. Although the older female (over 4 years) tends to spend a minimum time in "nesting," she experiences a delay in presentation of the litter. Older females commonly require eight to 12 hours, from the onset of labor, to complete whelping. In contrast, the 3-year-old dam usually completes whelping in less than four hours. Partial-to-complete dystocia at this age was exceedingly rare in this colony of dogs.

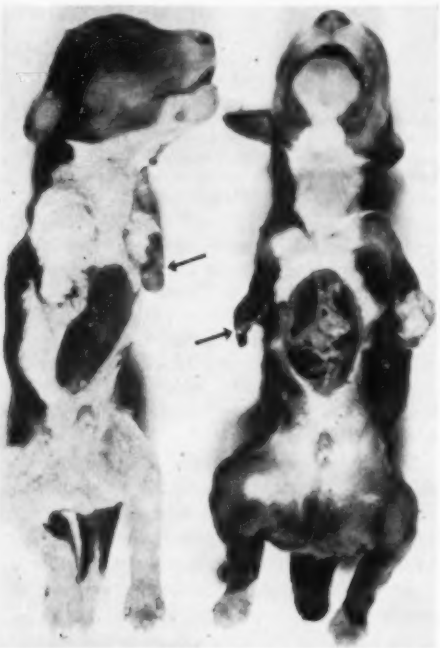


Fig. 2—Two pups showing anterior adactylia (arrows) and failure of the thoracic and abdominal cavities to close.

In terms of reproductive performance, the 3-year-old dam compares favorably in maturity with women between 25 and 29 years of age.[26] The life span of the dog and that of the pig were found comparable.[27] Like the dog, the sow reaches maximum reproductive performance at 3 years of age.[21,28,29]

In discussing fertility in relation to maturity in animals, Winters[30] states, "Every breeding female rises from infertility to increased fertility, usually reaching the peak early in her full maturity, and then gradually declines until she is again infertile." Although animals do not show the characteristic "change-of-life" signs experienced by women in middle age, in the aging dog the anestrus periods lengthen, fertility decreases, and mortality of the young increases. The senile dog may be completely infertile.

The trend (graph 2) suggested that pup losses above 20 per cent might be explained by the age of the dam. However, even the 3-year-old dam lost 20 per cent of her pups. This loss was the result of a number of factors (graph 1). A brief discussion of the extent and significance of each factor follows:

1) A few malformations were observed. The most apparent of the lethal congenital defects observed were adactylia and thoracic or abdominal fissures. These conditions have been observed both separately and together in individual pups. Two pups exhibiting adactylia and ventral fissures (fig. 2) were whelped in a litter with 3 normal pups. Of 1,157 pups, only these 2 suffered from this combined congenital defect.

2) Excessive licking, lactation failure,

and cannibalism have been seen occasionally. A dam may lick to excess 1 or 2 pups in her litter. The 9 cases observed in this colony involved lesions of the external genitalia. The lesions became so extensive as to prevent urination, and the puppies apparently died from uremia. A few died from inanition when their dams failed to lactate. Most dams, however, produced an ample supply of milk. The female in this colony averaged nine functioning glands and 4.95 pups per litter (table 2), almost two mammae per pup. There was no explanation for the cannibalism observed in four litters; the dams partially or completely devoured 1 to 3 puppies from their litters.

3) Climatic conditions affect puppy losses. Cold may be a contributing factor.[31] Our study, covering a four-year period, indicated that approximately as many pups died from heat as from cold. The 234 litters (table 2) were studied in respect to climatic variations during various seasons (table 3).

Monthly climatic variations did not coincide with fluctuations in pup mortality; mortality was lowest in May (15.8%) and highest in February (39.1%). However, the months preceding and following May and February showed higher and lower pup mortalities, respectively.

On the other hand, puppy deaths did coincide with sudden diurnal changes in climatic conditions. For example, on one summer day when the temperature rose abruptly to 106 F., 18 per cent of the pups in the breeding colony died from heat stroke. Fatalities were independent of litter size, and only pups between 8 and 21 days of age succumbed. Evidently they attempted to seek a cooler area and were unable to return to their litter nest after direct exposure to the sun. Similarly, a sudden change to cold weather resulted in increased losses. The highest puppy losses (34.3%) were observed during the fall (table 3). In this area, fall is characterized by comparatively rapid changes in temperature; a warm day may be followed by a cold night. Mortality seemed to coincide with sudden diurnal changes in climatic conditions more than with seasonal variations. This may explain the lack of correlation between puppy losses and seasonal variations seen in this study and in others.[3]

4) Disease was responsible for 29 (8.5%) of the pup deaths observed in this study (table 1). The presence of disease was determined by clinical, postmortem, or histological studies. There were 14 deaths from pneumonia, 8 from infectious canine hepatitis, 5 from septicemia, and 2 from distemper; there was not a large number of losses from any one disease. The possibility of an epizootic cause of neonatal losses had been investigated[3] but other factors seemed of more importance in a breeding colony.

TABLE 3—Seasonal Puppy Mortality

Season	Litters	Pups whelped	Pups weaned	Mortality (%)
Winter	52	260	185	28.9
Spring	76	378	274	27.5
Summer	62	303	216	28.7
Fall	44	216	142	34.3

5) Parasites caused a few pup fatalities (table 1). Pups in about half the litters were found to have a light-to-moderate infection of ascarids. Nine which died from a heavy infection of *Toxocara canis* had pale mucous membranes, moderate ascites, and 10 to 20 ascarids in the digestive tract. Ancylostoma and coccidia species were identified but did not cause death or failure in weight gains.

6) Accidents (table 1), largely due to faulty equipment or neglect on the part of the caretakers, claimed 20 pups. Although these causes were removed, they serve to illustrate the wide range of factors contributing to pup mortality.

7) One of the most insidious causes of puppy deaths is "bitch-culling," 1 or 2 pups in an occasional litter being pushed aside by the dam for no apparent reason. The abandoned pups show no visible lesions. Such cases were included in table 1 with the undetermined causes of death.

If we consider that pup losses are due to a variety of causes, the question arises of how many fatalities should a research or commercial dog-breeding colony expect.

A 34 per cent loss,[8] to 8 weeks of age, from 93 litters produced over a five-year period and a 32.1 percent loss[32] from 52 litters during a one-year period have been observed. In this study, a 29.4 per cent mortality (table 2) occurred from 234 litters over a four-year program. Thus, those conducting a dog-breeding program should expect approximately a 30 per cent loss in pups to the weaning age. Actually, the author believes that a mortality of only 20 per cent is possible. In this colony, losses

were reduced to 20 per cent by culling dams at 4 years of age.

SUMMARY AND CONCLUSION

1) The bitch to be bred should remain with the male for a limited time. Prolonged association of females in various stages of estrus with males decreases sexual desire on the part of the male.

2) The whelping female is primarily concerned with finding an area which provides seclusion and protection from intruders.

3) Whelping should be completed within four hours from the onset of labor; any delay in delivery is critical to pup viability.

4) Neonatal deaths account for about one third of pup losses to the weaning age.

5) The age of the dam is important in relation to pup production; in the Beagle, the optimum age is 3 years. Of the 29.4 per cent pup losses observed, approximately one third could be accounted for by the age of the dam.

6) About two thirds of the losses to weaning age were attributed to a number of causes: malformations, default of the dam, exposure, disease, parasites, accidents, and bitch-culling.

7) A dog-breeding colony can expect to lose 30 per cent of the pups to the weaning age. Culling dams at 4 years of age can reduce the losses.

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Aspirin and thyroid extract have several actions in common; in animals with myxoedema, both increase oxygen consumption and decrease the serum colostrol and hemodilution. They both produce metabolic stimulation but not of the same kind.—*Nature, Aug. 4, 1956.*

The Effect of O-Diazoacetyl-L-Serine (Azaserine) on the Pregnancy of the Dog

A Preliminary Report

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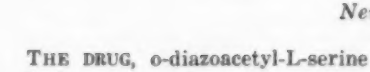
THE DRUG, o-diazoacetyl-L-serine (azaserine),



is an antimetabolite with a wide range of biological effects in animals, including man.[2-9, 12-16] It inhibits the growth of transplantable tumors in rats and mice[4,15,16] and produces developmental abnormalities in the chicken[6] and fat embryo.[1]

It has been found to inhibit the *de novo* synthesis of purines which results also in inhibition of nucleic acid synthesis.[10]

Its toxic effects have been examined in several species of animals including the mouse, rat, dog, and man.[2] The lethal dose is in the range of 10 to 50 mg. per kilogram of body weight for five days; in man, 10 mg. per kilogram daily for ten days will usually cause severe oral lesions.[7]

Besides its teratogenic effects, the rat embryo was reported to be extremely sensitive to the drug administered after implantation had occurred and through the twelfth day of gestation.[1] Single doses of 2.5 mg. per kilogram intraperitoneally caused fetal resorption in more than 50 per cent of the embryos, in contrast with an $l.d._{50}$ of 80 mg. per kilogram following a single dose for the maternal host; thus, the fetus is 25 times as sensitive as the mother to O-diazoacetyl-L-serine. It was, therefore, of interest to determine the effect of the compound on the canine fetus.

MATERIALS AND METHODS

Seventeen mongrel bitches, 1 to 5 years old, were selected for this study. They were fed a ration of horse meat, a dry commercial complete diet, milk, and vitamin supplements; they were housed in individual cages and were exercised in common runs. All were observed daily and signs of proestrus and estrus were recorded.

They were bred to 1 of 4 proved fertile males on two consecutive days during the eleventh to the seventeenth day from the start of proestrus and were recorded as 0 days pregnant from the time of the first observed mating.

O-diazoacetyl-L-serine, a white, crystalline powder, was dissolved in saline before each injection. The routine treatment consisted of administering 5 mg. per kilogram of the compound intramuscularly daily for three days (table 1).

TABLE 1—Time of Treatment After Mating

No. of dogs	O-diazoacetyl-L-serine (5 mg./kg., 3 days) Days after mating
2	19-21
9	20-22
3	21-23
1	29-31
1	30-32
1	51-53

Presumptive evidence of pregnancy could be obtained by palpation, beginning 19 to 21 days after mating, and the status of pregnancy was estimated by examinations twice weekly.

At various periods of treatment, the dogs were anesthetized with pentobarbital sodium, the abdomen opened, and the uterus explored. A section of one horn of the uterus with its implantation sites was removed in 12 dogs. The tissues were examined grossly and fixed in formalin (10%) for microscopic study. Pregnancy was allowed to continue in the remaining horn and stump.

RESULTS

The effect of O-diazoacetyl-L-serine on the 17 pregnant bitches is summarized (table 2).

Of the 14 pregnant bitches treated, fetal development ceased in 13. The fourteenth, A275, upon laparotomy on day 27, had 11 fetal implantation sites; five were removed with the right horn and six were left intact for further development. One apparently normal pup was whelped on day 63.

Three of the 14, A270, B138, and B150, which were explored on the thirty-second, forty-second, and forty-fifth days, respectively, showed a hyperplastic endometrium with complete fetal resorption.

Bitch A275, opened on day 27, showed nonmacerated fetuses. All fetal sites observed after 28 days of gestation were un-

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The author thanks Dr. Dominick Agostino for his helpful cooperation and for surgery performed; and Mr. Gustav Vespermann for his technical assistance.

TABLE 2—Effects of O-diazoacetyl-L-serine (5 mg./kg. Daily for Three Days, Intramuscularly) on the Course of Pregnancies in Bitches

Dog No.	Weight in kg.	Period of treatments	Laparotomy observations during gestation: Day	No. of fetal sites	No. removed	Condition of fetuses and fetal membranes	Follow up
A278	17.3	19-21	45	5-6	1	Resorbing Sites were confluent	Did not whelp
B150	12.27	19-21	45*	.....	.....	Complete resorption	Did not whelp
B138	16.6	20-22	42*	.....	.....	Complete resorption	Did not whelp
A270	13.75	20-22	32	.....	.....	Complete resorption	Did not whelp
B223	10.0	20-22	46*	6	.....	Resorbing	Did not whelp
A272	16.0	20-22	45	11	5	Resorbing	Did not whelp
A267	13.4	20-22	38	> 2	2	Resorbing Placenta still intact	Did not whelp
A259	21.4	20-22	31	1	0	The one fetus was not disturbed	Did not whelp
A223	19.1	20-22	30	7	3	Resorbing-placenta intact	Did not whelp
B220	20.0	20-22	28†	4		Resorbing	Did not whelp
A275	18.2	20-22	27	11	5	Nonmacerated	Whelped 1 normal pup
A260	14.0	21-23	46	6	2	Resorbing	Did not whelp
A234	20.0	21-23	No laparotomy performed				Did not whelp
B190	20.0	21-23	No laparotomy performed				Did not whelp
B 94	16.8	29-31	No laparotomy performed				Whelped 10 normal pups on 61st day
B149	9.9	30-32	No laparotomy performed				Aborted on 36th day
B111	16.8	51-53	No laparotomy performed				Whelped 3 normal pups on 63rd day.

*Euthanized; †hysterectomy.

dergoing autolysis, the fetal membranes also were in various stages of disintegration. There was a range of one to 11 fetal sites in the 7 females where the count was recorded accurately.

Of 3 bitches treated later in pregnancy, B94, treated on days 29 to 31, whelped 10 normal pups; B111, treated on days 51 to 53, whelped 3 normal pups; and B149 treated on days 30 to 32, aborted on day 36. She had a severe gastroenteritis from the sixteenth to the twenty-first day. It is not known whether the weakened condition of the animal or the drug, or both, was the cause of the abortion.

In most females treated between days 19 to 23, the uterine masses continued to enlarge until days 27 to 34. From the days 35 to 40, it became evident that fetal growth had ceased; the uterine masses had lost their tone and felt soft and flaccid upon palpation.

DISCUSSION

The bitch is a monestrous, polytocous animal, having two breeding seasons in the year, approximately spring and fall. The proestrus period lasts about a week and passes imperceptibly into estrus which also lasts about a week. Ovulation occurs near the beginning of estrus but the ova are not mature for fertilization until several days later when the first polar bodies are shed. Breeding late in the heat period to insure immediate fertilization of the ova is optimum in order to establish an accurate count of days pregnant.[18,19] Ninety per cent fertility, or better, can be expected with mongrel dogs.[17]

Attachment of the embryo to the uterine wall occurs approximately on the twentieth day after conception.[19] In this study, treatment was given at this time. The duration of pregnancy is about 60 days.

Pregnancy can be determined and followed by palpation starting at the twentieth day of gestation.[20]

Removal of the anterior portion of one horn of the uterus, including one or more fetal sites, would not be expected to interfere with the continued growth of the remaining viable fetuses. (This has been shown here and in subsequent work). The fertility and fecundity, however, may possibly be lowered in the future breedings.

A study to determine whether there will be any untoward effect on fertility or future pregnancies of the bitch after fetal death and resorption will be undertaken at the next breeding.

The $l.d._{50}$ of O-diazoacetyl-L-serine for the dog is between 5 to 10 mg. per kilogram per day intravenously for ten days.[2] It was reported[2] that 6 out of 6 dogs receiving 10 mg. per kilogram per day of the drug died on days 4 to 11 showing anorexia, emesis, progressive weight loss, hemorrhagic diarrhea, ulceration of the buccal mucosa, and

jaundice. There was a consistent elevation of the hematocrit, a hypochloremia, and a hyperproteinemia, all probably because of dehydration induced by the anorexia, emesis, and diarrhea. A reticulopenia and lymphopenia was evident.

On necropsy, there were no noticeable macroscopic changes, except jaundice in 1 dog. Microscopic changes reported were nuclear and cytoplasmic swellings of the mucosal glands of the small intestines and colon, but less severe in the colon; submucosal swelling and hemosiderosis and fatty acid changes in the liver; and a diffuse pancreatitis.

Dogs given 5 mg. per kilogram per day of the drug intravenously for ten days all survived.

The animals responded to treatment in the same way as the group given 10 mg. but the intoxication proved less severe. Weight loss and reduced food intake were evident two to three days after the start of treatment, and persisted into the week following the end of treatment. All dogs appeared well one month following initiation of treatment.

The dose of O-diazoacetyl-L-serine for this study was a fraction of the $l.d._{50}$ for the dog. The only toxic symptom observed was an occasional anorexia which occurred after the second or third injection of the drug and lasted one to two days.

No studies have been made, as yet, on any developmental defects of fetuses surviving various courses of administration of the drug. No studies have been made of treatment before day 19, nor have any variations of the dose been studied.

The present accepted field method of handling mismating in the bitch is to treat the female within one to two days after copulation with excessive estrogens. It is thought that this treatment prevents nidation. If pregnancy is well established, there has been considerable development of the corpus luteum, and then it is difficult, if not impossible, to terminate pregnancy by this method.[21,22]

High dosage of estrogens usually prolongs the estrus of the bitch and causes other side reactions.[23]

It is conceivable that this drug could be considered an effective adjunct to the present methods of handling mismating in the bitch after further studies have been made along these lines.

SUMMARY

Of 14 pregnant bitches, treated with O-diazoacetyl-L-serine (azaserine) from the nineteenth to the twenty-third day of gestation, fetal development ceased in 13. In the other bitch, 1 pup survived of the 6 allowed to remain after a partial hysterectomy on the twenty-seventh day of gestation.

Partially and completely necrotic fetuses enveloped in disintegrating fetal membranes were evident when selected animals were examined by laparotomy during the twenty-eighth to the forty-seventh day of gestation.

Apparently the fetus approaches the mother in its resistance to the drug sometime after the twenty-ninth day of gestation.

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Variations of Hog Cholera Virus

In repeated tests, doses of 2 or 5 cc. of crystal violet glycerol (CVG) vaccine, prepared from regular hog cholera virus, produced adequate immunity in all pigs when challenged with regular virus three weeks after vaccination.

Similar treatments of like pigs in the same tests produced adequate immunity in only a part of the pigs challenged with variant hog cholera virus, fewer animals being protected by the smaller dose than by the larger dose. These immunogenic variations occurred even though the infectivity titers of the variant virus used for challenge was ten to 100 times less than the regular virus used for challenge.

Doses of 2, 5, or 10 cc. of CVG vaccines, prepared from variant hog cholera virus, produced adequate immunity in only a small percentage of pigs challenged with regular or variant hog cholera virus. Low infectivity titers of the variant virus used for production of these vaccines may have been responsible for their low potency.

The differences demonstrated by the use of these vaccines and viruses conform to the variations of immunogenic and antigenic properties of the same or similar agents demonstrated in previous studies by the use of the simultaneous serum-virus method of immunization.—[*C. N. Dale, M. R. Zinober, and J. P. Torrey: Variations (Variants) of Hog Cholera Virus. IV. Comparative Potencies of Crystal Violet Glycerol Vaccines Prepared from Regular Hog Cholera Virus and Variant Hog Cholera Virus. Am. J. Vet. Res., 18, (Jan., 1957): 112-118.*]

Protection Against Rabies

Veterinarians and others who may be frequently exposed to rabies should consider pre-exposure prophylaxis. The method recommended by a committee of the World Health Organization consists of small doses of chicken embryo vaccine or a few doses of tissue vaccine, then giving a single booster dose of vaccine after each bite exposure. The committee warns that in spite of the indicated value of antirabies serum following exposure, the possibility of a serum reaction requires sensitivity tests and may limit the use of serum to persons who are severely exposed. After cleansing the bite wound with soap and water, and cauterizing it with nitric acid, it is recommended that serum be injected around the site of the wound.—*WHO Release, Dec. 11, 1956.*

Canine Population of the United States

Indications are that the nation's dog population has passed the 25,000,000 mark, an increase of 2,500,000 since 1953. A definite trend toward purebred dogs is reported since it is important to know what the "cute" pup will be like when it matures. Although most owners of purebreds do not take the trouble to register their pets, it is calculated that perhaps one third of the dogs in the United States today are of pure lineage. Currently tops in popularity, according to registration figures, are the Beagle, Boxer, Cocker Spaniel, Dachshund, Chihuahua, German Shepherd, Collie, Poodle, Pekingese, and Boston Terrier.—*News Bull., Gaines Dog Research Center.*

Equine Diseases in Antiquity

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ALMOST ALL diseases of the organs of the horse that are classified today were already known and described many centuries ago, and it is remarkable that even their nomenclature has remained largely unchanged.

DISEASES OF THE DIGESTIVE TRACT

Among the diseases of the digestive tract, the "Hippiatrica"* mentioned irregularities in the first and second dentitions, changes in adult teeth, abscesses of the gums, caries of the jaw, salivary calculi, and salivary fistulas as the sequelae of an abscess or unskilled surgical intervention. Tumefaction of the palate (*lampas*), common in foals, was treated by bleeding the palate. Care had to be taken to avoid the palatine arteries. Parotitis was thoroughly studied by Apsyrtus† who insisted that it was dangerous to open an abscess of the salivary gland, because this was frequently followed by a salivary fistula. Fractures of the mandible were treated by immobilization with hollow splints kept in place by bandages for 40 days.

Vomition was distinguished from regurgitation which was due to pharyngeal angina. [Whether the vomition was associated with stomach rupture was not mentioned.]

The colics described by Aristotle, differentiated from other abdominal pains, were classified according to their causes and lesions. They occurred as a result of eating too much food or forage, from spoiled grain, water that was too cold or inferior in quality, or the presence of worms in the intestines. Even though the lesions were quite confused, intestinal congestion was readily recognized by its characteristics of violent abdominal pain, movement, rolling, sudden collapse, moaning, and sweating. The distention of the organs with gas was given the picturesque name of tympanitis. In intestinal invagination (*ileus*), characterized by the violence of the pain associated with the absence of all evacuation, the horse lay on its back and groaned. Volvulus (*chordapsus*) caused still more violent pain and stoppage of defecation, and it always terminated in death.

The serious diarrheas, which were difficult to identify and were accompanied by violent straining, sometimes caused prolapse of the rectum which was treated by scarification, warm water applications, pessaries, and temporary sutures.

Ascites, characterized by edema of the legs, chest, belly, inguinal region, cold tumefaction "which held the fingerprint," and by the distention of the lower region of the abdomen, was differentiated from tympany by the latter's resonant sound on percussion of the abdomen. Treatment consisted of tapping in the umbilical region either with a reed or a *fistula centetalis*, a fenestrated cannula, or by piercing holes, thereby permitting the liquid to flow out. Care had to be taken not to wound the intestine. If the omentum herniated, the wall was sutured.

The diseases of the liver, studied at length especially in the mule and the ass, are impossible to identify. Possibly, they constituted special forms of certain regions such as microbial or parasitic invasions or chronic plant intoxications.

RESPIRATORY, URINARY, AND CENTRAL NERVOUS SYSTEM DISORDERS

Among the diseases of the respiratory tract, only those regions that were directly accessible were well observed. Polyps of the nose were considered common in Sarnates horses, in particular, and were treated either by excision or cauterization. Outside of glanders and strangles, the inflammations of the mucous membranes correspond to local conditions in the larynx, trachea, and bronchi.

The descriptions of pneumonia are extremely confusing. By reading them one can appreciate the advantages which percussion and auscultation have brought to the clinic. The authors described every type

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Translated, edited, and modified from Leclainche, E.: Histoire de la Médecine vétérinaire. Office du Livre, Toulouse (1936): 72-77.

*The "Hippiatrica" was a Byzantine compilation dating about 300-450 A.D.

†Apsyrtus was a famous Byzantine veterinarian who lived about 300 A.D.

of bronchial and pulmonary condition together: various pneumonias, purulent infections, glanders, and others. The major symptoms were put into their pathological places and the many aspects of dyspnea (*anhelitus*) and cough were classified. They were treated by fumigations, purgatives, and also by the strangest and most complex medications.

There is plenty of proof that the difficulties incident to urinary excretion were studied in great detail. Dysuria, stranguria, and ischuria were differentiated and considered as specific diseases. The "urinary colics" were characterized by efforts at micturition and the various attitudes assumed. The treatments, so numerous that they belied their lack of efficacy, were irritant massage of the loins, fumigations under the belly, introduction of irritant agents (onion, salt) into the ureter, and massaging the full bladder *per rectum*.

Calculi of the bladder and the urethra were dreaded because of the possibility of bladder rupture and were treated by massage and even cystotomy through a perforation of the rectum. Hematuria was treated by bloodletting, especially in plethoric subjects.

The diseases of the central nervous system were studied only from the standpoint of their manifestations, which were phenomena of excitation such as delirium or epilepsy, and contractures such as tetanus or paralysis. Delirium accompanied certain diseases such as rabies. It was continuous or intermittent and often terminated in death. It caused depression of the sensory mechanism and locomotor disorders (dizziness).

TETANUS, PARALYSIS, REPRODUCTIVE DISORDERS

Tetanus was well known but was confused with freezing, which commonly occurred when armies went through mountainous places in the winter. Apsyrtus was the first to acclaim the etiology of traumatic tetanus which followed nail punctures of the foot, groin wounds (castration tetanus?), or burns. The anterior localization with trismus of the jaws was more serious than lumbar contraction (opisthotonos). The therapeutics were of uncertain origin and were not consistent. They included laying the animal on fresh manure or on warm sand, application of hot baths to raise the temperature (all supposed to be for freezing), cauterization of the wounded regions, and bloodletting. The paralysis affected the posterior part of the body, and whatever other part, and was either complete or incomplete (paresis).

A form of paraplegia, characterized by unsteadiness of the hindquarters and by the expulsion of black, thick urine, neatly corresponds to myohemoglobinuria (azoturia). It was, probably, the ensuing crural paralysis that Apsyrtus treated by point firing below the hip.

Paralysis of the penis was treated by local irritation with scarifications sprinkled with vinegar, and friction with nettles. Orchitis of traumatic origin was treated with emollient poultices and, if it persisted, by bleeding the saphenous vein or by cauterization of the scrotum. Inguinal hernia, common in old horses (Apsyrtus), was reduced by taxis followed by a ligature high on the cord.

Uterovaginal prolapse was treated with the animal lying on its back. The herniated part was washed with warm water, scarified with a needle, and sponged with a mixture of wine and olive oil before it was replaced. A bladder, introduced into this re-established cavity, was inflated and tied; the vulva was sutured and, ten days later, the bladder was deflated and removed.

DISEASES OF THE EYE AND SPINE

The diseases of the eyes of man were commonly mentioned in antiquity. They seem to have been common among all the peoples of Asia, Egypt, and the Aegean shores. Ophthalmia epidemics prevailed among the populations, especially among the slaves. All the sequelae were mentioned, and the proportion of blind people was considerable. Thus, hippiatrists must have been in possession of a good deal of ophthalmic documentation. In fact, all the conditions we know today were described.

Entropion in both man and animals was treated in two ways: a flap of skin, some distance from the border of the affected lid, was cut out and the wound edges were sewed together; or the lid was deeply cauterized in such a way that the contraction of the scars would put it back in place. Conjunctival growths (granuloma conjunctivitis?) were split, excised, and cauterized. Corneal growths (pterygia) were picked up with a levator and removed, taking care not to damage the cornea. Corneal ulcers and staphylomas were described and treated. Mydriasis was known, and also

amaurosis, which was characterized by a dilation and paralysis of the pupil without power of adaptability.

Among the internal ophthalmias, a form, characterized by its intermittent occurrence (lunaticus oculus), positively corresponds to periodic ophthalmia. It was treated with hot fomentations, bleeding the angular vein of the eye, collyria, and cauterization of the temples.

Cataracts were removed by operation. After the horse was starved, it was cast on soft ground and its head was firmly tied. Then a special knife (*paracenterium*) was inserted into the eye, making sure to avoid injuring the ciliary body, and with the point the white mass was lowered backward and downward, care being taken that it would not rise when it was released. If the operation were successful, the eye became transparent and vision was restored. The horse was kept on a special diet in order that the movements of the jaws would not loosen the lens from its attachments. (Just what this diet was, and how long it was to be administered, are not mentioned.—Translator.)

The local inflammatory conditions of the vertebral column (nuchal disease, saddle gall, back and loin injuries), which were due to various trauma (blows, harness wounds), were treated by poultices. The abscesses were opened with a knife or, better still, with a cautery.

Disorders of the Legs and Feet

Many chapters were written about the pathological conditions of the legs.

Luxations were studied in great detail by the Greeks and many therapies were gleaned from human medicine. Even though ruptured ligaments were incurable, distended joints could generally be treated. The attachments of the patellar ligaments were well described, as well as the methods of reducing patellar luxations. In recurrent luxations of the patella, line firing was indicated.

Not much was known about articular inflammations. On the other hand, lesions of ligaments and tendons were specifically treated. Sprain of the fetlock joint, characterized by lameness, the attitude assumed by the foot, heat, and local pain, was treated with bandages and local bloodletting. In nonspecific fetlock lameness, tenotomy was practiced, in addition to the application of an apparatus that immobilized the region and gave a partial support to the foot as it struck the ground.

Laminitis, mentioned by Xenophon, was considered due to fatigue associated with eating food that contained too much barley. The pain caused the animal to walk only with extreme difficulty, to shiver, sweat, tremble, and the local vessels were hyperemic. It might result in the loosening and falling off of the hoof. Treatment demanded the correction of the diet, many bleedings of the pasterns, counterirritations over the shoulders and the whole leg and, only later on, short walks.

The superficial wounds of the foot, due to foreign bodies, necessitated only cleaning the foot and applying copper sulfate powder to it. If the wounds were deep, either the cornual layer was thinned and poultices were applied or the wounded parts were burned with a cautery. The foot was bandaged and covered with a boot.

Contusions (corns), and all their complications, commonly occurred in the dry and stony mountain regions. The source of foot infection was determined by the localization of pain, paring down the horny layer, and palpation. The most generally accepted treatment was to evacuate the pus as soon as possible, in order to avoid fistulas under the hoof. After dressing the foot, the boot was replaced and no treatment was given again until three days later. Suppurative conditions of the sole were treated by paring it in the same way that is done today, *i.e.*, by making a circular incision with a special instrument, the *circumcisorium*.

The hygiene of the foot was of capital importance. The protective apparatus of the hoof did not seem to be well known by the Greeks, for they had only limited use for it. Apsyrtus characterized bad feet as those with soft and tender hoofs, and good feet as having hard and resistant ones. Above all, it was recommended that the floor of the stable (oakwood) be clean and dry. If the hoof became too dry, it was soaked with poultices and covered with body fat. The equilibrium was maintained and the growth of the foot was regulated with a knife or, better still, with a warm cautery.

The Romans used boots with metal soles, that were attached to the hoofs by bandages, or leather shoes (*hipposandales, solea, calcea*). Catullus spoke of the *solea ferrea* of the mule that would become de-

tached from the foot in the thick marshes. There were many types of these appliances as well as instruments, such as the knife (*ferramenta concisoria*) and pliers used in the preparation of the foot. A Roman sculpture shows a veterinarian holding a hipposandale and the handle of a farrier's knife (*hufmesser*).

The use of these complicated and costly tools was necessarily limited. We know how luxuriously shod were the horses and mules of the sovereigns of Imperial Rome. According to Dion Cassius, Pertinax, the favorite horse of Emperor Commodius, had golden shoes. Suetonius wrote that Nero did not travel with less than a thousand carriages drawn by silver-shod mules, and it is probable that the rich patricians more or less followed this example. It is possible that the shoe was used for war cavalries and in certain transports, but there is no proof that it was generally used.

The mention of the *aptatura pedum* in the Edict of Diocletian can be applied to the preparation of the hoof for the fixation of the solea, and it can also simply mean the trimming of the foot, which was all the more necessary since it had less protection. This latter interpretation is the more probable one if the fact that the edict had only the current procedures in view is considered. On the other hand, they usually had recourse to wrapping the feet in braided cord or reed grass, as Columella reported was done with cattle.

Vesicular Stomatitis in Deer

Recognition of an enzootic focus of vesicular stomatitis in the southeastern United States led to the establishment of a cooperative research project between the U. S. Department of Agriculture and the Wisconsin Experiment Station. Deer, among a number of other wild and domestic animal species, were found to possess significant antibody titers. Experimental infections in deer were, therefore, studied, in Georgia, to obtain more information about the clinical manifestations and duration of the disease.

Deer were found to be susceptible to vesicular stomatitis, infection being produced by minute amounts of virus introduced intramucosally or intradermally in the mouth or feet. The disease varied from severe to mild or inapparent. Histopathological changes resembled those seen in domestic animals similarly infected. Reisolation of virus was possible only during the early stages of the disease and antibody response was rapid, yielding high neutralizing titers in serum.

It was concluded that deer are not important as reservoirs of infection but that, since their susceptibility is high, they may help to propagate seasonal epizootics. The disease could be fatal in wild deer depending upon the degree to which it interfered with feeding and locomotion. The research findings agree with reports by residents of the enzootic area who have observed deer with sore mouths and feet.—[*Lars Karstad and R. P. Hanson: Vesicular Stomatitis in Deer. Am. J. Vet. Res., 18, (Jan., 1957): 162-166.*]

Effects of Environment on *Leptospira Pomona*

The survival of *Leptospira pomona* outside the animal body seems to be related to an interaction of several factors, including temperature, pH, moisture, the various constituents of soil and water, and the presence of naturally occurring microorganisms.

Temperatures below 7 to 10 C. or above 34 to 36 C. and pH below 6.0 or above 8.4 were detrimental to the survival of *L. pomona*. They survived longer at 7 to 10 C. in the lower pH ranges than in the higher and, conversely, for longer periods at 20 to 26 C. in the higher pH ranges. *Leptospira pomona* was susceptible to both drying and slow-freezing, survival not exceeding one half hour in the former and two and a half hours in the latter.

Moisture was extremely important, these organisms surviving from 30 minutes in air-dried soil to 183 days in soil supersaturated with water. They survived for less than seven days under simulated natural conditions and longer in stagnant pools than in moving water. However, the continuous addition of small amounts of fresh water to stagnant pools increased the organism's survival time.—[*W. Okazaki and L. Ringen: Some Effects of Various Environmental Conditions on the Survival of Leptospira Pomona. Am. J. Vet. Res., 18, (Jan., 1957): 219-223.*]

Young roosters which have survived whole body x-ray irradiation reproduce normally after a recovery period of ten to 12 weeks.—*Poult. Sci., Nov., 1956.*

Torsion of the Bovine Cecum

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IN DOMESTIC animals, acute intestinal obstruction, due to torsion of the intestine, occurs most frequently in the horse, in which it may account for 2 to 5 per cent of all cases of colic.[1] It is rare in other species.[2] In cattle, acute intestinal obstruction usually results from intussusception of the small intestine, while torsion and strangulation of the intestine are rare. No record of torsion of the bovine cecum can be found in the literature but this condition was recently described.[3] Torsion of the cecum occurs occasionally in the horse[1] and in man.[4]

The condition was observed in a Jersey cow, 8 years old, and in a Guernsey bull, 16 months old. The cow had been treated four months previously for atony of the rumen, the cause of which could not be determined. There was no history of previous illness in the bull.

The symptoms the owner had observed for 24 hours in the cow were inappetence, diminished milk flow, absence of feces, and colic. The latter was manifested by kicking at the abdomen, treading movements of the hindlegs, and restlessness. The cow was alert; temperature, 100.4 F.; pulse, 68; and respirations, 18 per minute. The mucous membranes were injected, there was a moderate degree of dehydration, and the extremities were cold. Rumen motility was absent and no abdominal or thoracic pain could be detected. Mild tenesmus was observed and small amounts of tarry, mucous-covered feces were passed infrequently. Rectal examination revealed a tense fluctuating organ, apparently intestine, at the pelvic inlet just beneath the wing of the right ilium. It was elongated and extended downward, forward, and to the right until it passed beyond reach. Manipulation of the organ caused no obvious pain. The blood picture showed a mild neutrophilic leukocytosis.

The owner reported that the bull showed inappetence and malaise for two days with diarrhea for three days previous to examination. He had a mild pyrexia and suppressed rumen function which were treated symptomatically. When again seen, three days later, there had been a serious deterioration in the animal's condition. He was weak and had difficulty in rising. The temperature was 100.8 F.; pulse, 100; and there were signs of severe dehydration and shock. The respirations were accompanied by moaning, and the animal held its head to one side. Auscultation and ballottement of the abdomen revealed the presence of abdominal fluid. Tenesmus was not observed, although there was slight elevation of the tailhead. No feces had been passed, yet the rectum contained a small amount of mucus only. A distended loop of gut similar to that described in the cow could be palpated *per rectum*.

In each case, the diagnosis was acute intestinal obstruction and surgical correction was achieved by means of laparotomy through the right midflank. Upon opening the abdominal cavity of each animal, a distended segment of gut was apparent and a serosanguineous exudate drained from the ventral commissure of the incision. In the cow, the omentum had to be displaced anteriorly to expose the distended gut. In the bull, the omentum could not be seen, nor could it be found attached to the duodenum. The distended gut was identified as the cecum which was then delivered through the incision. A torsion could be palpated at the proximal end of the cecum but, due to the marked distention, it was difficult to perform any corrective manipulations until the cecal contents were evacuated. Cecotomy was performed at the tip of the organ to prevent contamination of the laparotomy incision. When the cecal contents had drained, the cecotomy incision was closed with a continuous Lembert suture. With the cecal distension relieved, it was possible to see the torsion.

The gross lesions were similar in the 2 animals but were more advanced in the bull. In both, the common mesentery in the region of the torsion was edematous and hemorrhagic, the small bowel was distended and congested and, in the bull, the mesenteric

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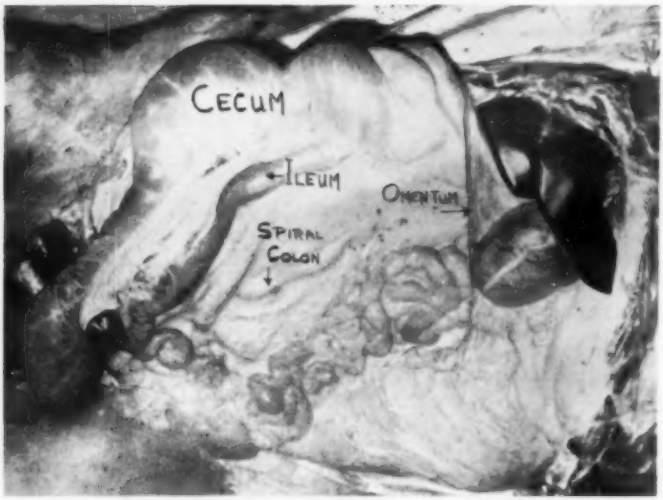

Fig. 1—Right lateral exposure of the bovine abdominal viscera, illustrating the relationship of the ileum, colon, and cecum. The omentum is reflected anteriorly, and the cecum has been lifted out of position.

lymph nodes were enlarged, congested, and edematous. The torsion was relieved by a 270-degree, counterclockwise rotation of the distal portion of the cecum. The laparotomy incision was then closed.

The cow recovered uneventfully. She ate and defecated normally the day after the operation but was given oxytetracycline, 1.5 Gm. daily, for three days. The skin sutures were removed on the eighth day, and she was normal and in good health three months later.

In the bull, the relief of the obstruction was much more dramatic, copious amounts of watery feces being passed before completion of the operation. He showed shock and severe dehydration, and was given blood (4,000 cc.) and Ringer's solution (8,000 cc.) over a period of three days, in addition to the administration of antibi-

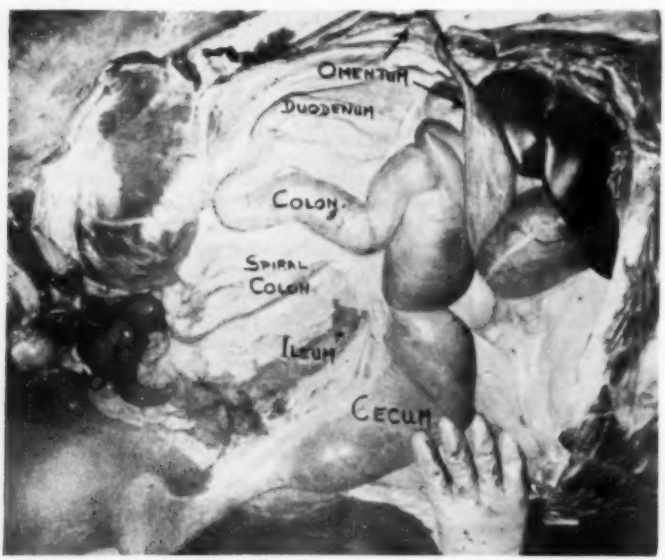

Fig. 2—Exposure of the bovine abdominal viscera as in fig. 1. The cecum has been reflected ventrally to show its relationship to the colon and duodenum.

otics. By the fourth postoperative day, he commenced to eat and was bright and alert. On the fifth day, signs of an intestinal obstruction recurred and laparotomy revealed that the cecum had again become twisted. The torsion was again corrected but the animal died 36 hours later. Necropsy revealed at least a 90-degree, rotation of the mesentery at its root, absence of that part of the common mesentery suspending the cecum from the colon, and no attachment of the omentum to the common mesentery in the region of the duodenum.

DISCUSSION

The bovine cecum is about 30 inches long in an adult. Its origin is usually located medial to the ventral extremity of the last rib, from which point it extends chiefly backward to the right side of the pelvic inlet where it terminates as a blind sac (fig. 1). The proximal part of the cecum is suspended within the common mesentery and is related to the colon dorsally, to the terminal portion of the ileum ventrally, to the omentum laterally, and to the rumen medially (fig. 1-4). The distal (caudal) third of the cecum is free, variable in position, and may be reflected forward so that it occupies a position dorsal or ventral to its proximal part.[5]

Since only the terminal part of the cecum is freely mobile, this would seem to be the only part likely to become twisted. However, when operated upon, both animals had an obstruction and distention of the small intestine, indicating that the colon or the ileum, or both, must have been involved in the torsion. This could not be confirmed by direct observation at the time. Twisting of the cecum in the cadaver does result in the occlusion of the ileum, a small loop of which is drawn across the cecum and included in the torsion. Attachment of the ileum to the ventral surface of the cecum extends further distally than does the attachment of the colon to the dorsal surface of the cecum (fig. 4). This accounts for occlusion of the ileum prior to the colon which may later become involved, but to a lesser degree.

In the bull, the lack of normal suspension of the cecum from the colon and absence of the normal attachment of omentum to the greater mesentery probably predisposed to the cecal torsion and also to the rotation of the mesentery which was observed at necropsy.

Diagnosis of acute intestinal obstruction should present no problem. Symptoms indicative of this condition include colic, scanty dark-colored mucoid feces, tachycardia, tenesmus, and the presence of distended loops of gut on rectal examination. In more advanced stages, the abdomen may appear enlarged, due to intestinal distention and due to peritoneal exudate. The

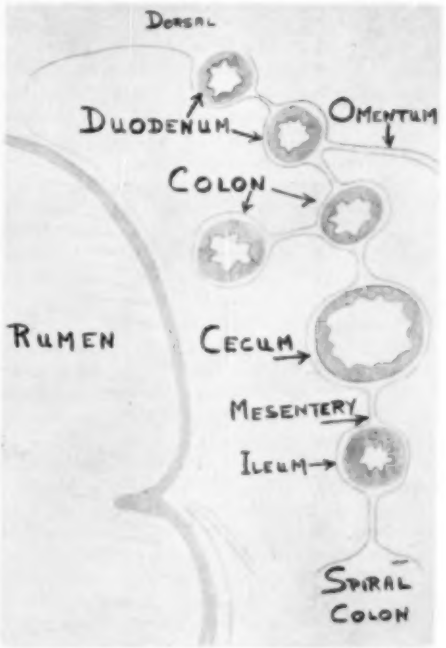

Fig. 3—Diagrammatic cross section of the bovine abdomen in the region of the cecum illustrating the suspension of the cecum within the common mesentery.

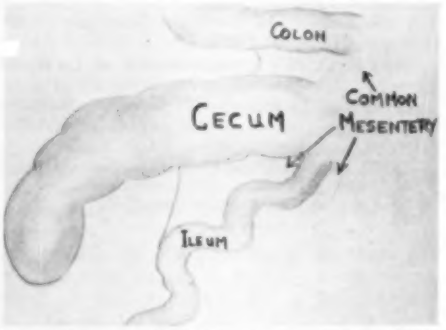

Fig. 4—Diagram illustrating the suspension of the cecum between the colon above and the ileum below.

latter may be detected by ballottement or, if any doubt exists, by abdominal paracentesis. As the obstruction progresses, symptoms of shock and dehydration develop. These include a hidebound skin, dull sunken eyes, cold extremities, a weak pulse, and peripheral circulatory collapse.

Differentiation of torsion of the cecum from intussusception, which is apparently the most common cause of intestinal obstruction in cattle, would appear to be more difficult. Dark, tarry feces, as observed in intestinal intussusception, were not seen in cecal torsion.[3] Differentiation may possibly be made by rectal examination for, although intestinal distention occurs in a similar location in each condition, the enlarged cecum is more fluctuating and less turgid than an intussusception.

Treatment should consist of immediate laparotomy and correction of the torsion. In view of recurrence of the condition in the bull, removal of the cecum should be considered. If shock or dehydration exist, it is most important that both the intravascular and extravascular fluids should be replaced by blood and by electrolyte-dextrose solution.

SUMMARY

Torsion of the cecum is described in a cow and in a bull. Both were corrected by laparotomy and manipulation. The torsion recurred in the bull in five days, resulting in death. The cow made a complete recovery. The symptoms, diagnosis, and treatment are discussed.

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[4]Powell, J. H., and Bowers, Ralph F.: Volvulus of the Cecum. Ann. Surg., *143*, (Jan., 1956): 126-130.

[5]Sisson, Septimus, and Grossman, James Daniel: The Anatomy of the Domestic Animals. 3rd ed. W. B. Saunders Co., Philadelphia, 1940.

Repair of Ruptured Bovine Uterus by Laparotomy.—After a relatively easy extraction of a schistosomus reflexa fetus from a 4-year-old cow, the dorsal wall of the uterus was found to have a transverse tear 8 to 10 inches long. An 8-inch vertical incision was made high in the left flank, both hands were inserted, and the uterus was repaired, using four strands of doubled No. 1 catgut in a close, continuous suture through the peritoneum and muscular wall of the uterus. The suturing was done with the right hand while the fingers of the left hand were inserted through the uterine wound to hold the edges in apposition. Penicillin was used on the uterus and sulfanilamide on the flank wound, which was then sutured. When the sutures were removed nine days later, the cow was in good health, and giving 6 gal. of milk daily.—*Vet. Rec., Nov. 24, 1956.*

Renal Lesions Associated with Pregnancy.—The two factors chiefly responsible for physiological changes in the kidneys and ureters of 90 per cent of pregnant women are hormones that control the course of pregnancy, and pressure of the gravid uterus on the ureters at the pelvic brim (the latter does not occur in quadrupeds). The hormonal influence produces dilatation, atony, and reduced irritability of smooth muscles in the entire upper urinary tract.—*J.Am.M.A., Dec. 8, 1956.*

Mycotic Abortion in a Cow.—A cow, 6 years old, aborted a 4-month fetus after requiring several artificial inseminations following an abortion at the fifth month of the previous pregnancy. Tests and cultures produced no evidence of pathogenic bacterial infection but *Aspergillus niger* was repeatedly cultured from fetal specimens. Transmission from cow to cow would seem to be excluded.—*Brit. Vet. J., Oct., 1956.*

Sex Determination by Selected Spermatozoa.—It was assumed that female-producing spermatozoa, with a large X-chromosome, would have a greater volume or density than the male-producing ones, but this difference, if present, was obscured by the increasing size of the cells during maturation. Bull semen, in which only 5 per cent of the sperm were retained after centrifugation, in one experiment, was used to inseminate 24 cows. Of the 11 calves produced, all were males; in the control group, 3 were males, 6 females. In an earlier experiment, the sex rate was not affected.—*Nature, Sept. 1, 1956.*

Observations on Transmissible Canine Venereal Granuloma

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During 1956, 7 dogs with venereal granuloma were presented to the author for examination and treatment. The usual history was that drops of blood had been coming from the penis of the affected animal for three to five days. The dogs, 1 Spitz, 3 German Shepherds, and 3 of mixed breeding, varied in age from 2 to 7 years. All had a history of long absence from home but no proved exposure to infected females.

By retracting the sheath, the fragile and vascular growths were exposed (fig. 1) on the prepuce and penis. In most cases, a pedunculated attachment was present, except for those occurring on the penis, which usually had a larger base attachment.

Surgical removal in all cases was successful. Silk sutures were more satisfactory than catgut. Antiseptic ointment was placed in the sheath until affected areas were healed. In 1 dog, there were numerous foci of widely scattered, small masses. No attempt was made to remove them. They did not develop further and it is surmised that spontaneous regression followed. It had been reported that spontaneous disappearance may occur, with or without ulceration, and that immunity follows.

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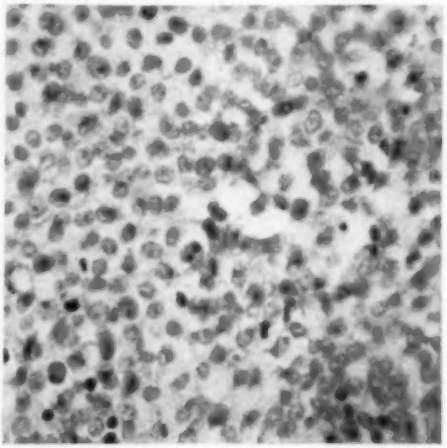
Fig. 1—Photograph of the cauliflower-like tumorous growths present on the mucous membrane of the dog's penis and prepuce. Some of the tumors were pedunculated, while others had a broader attachment at the base. All growths were vascular and exuded serum and blood.



—*A.F.I.P. 5621383*

Fig. 2—A section of the canine venereal tumor showing it to be composed of polyhedral mononuclear cells. The cells are relatively small, with limited cytoplasm. In the proliferative phase of the tumor, numerous mitotic figures are seen. H & E stain; x 500.

HISTOPATHOLOGY

Tissue from one specimen was forwarded to the Armed Forces Institute of Pathology for study; their report follows:

This particular neoplasm is interpreted as a transmissible venereal tumor and not a counterpart of the malignant lymphoma as seen in man, which also occurs in the dog. It has been variously interpreted as lymphosarcoma and reticulum cell sarcoma but the exact nature of the cell type must still be considered debatable. This type of tumor rarely metastasizes, may undergo spontaneous regression and usually produces an immunity to itself in recovered dogs. It is naturally transmitted by coitus and has been sucessfully transmitted experimentally only by the use of viable cell transplants.

Prior study of tissue from the same dog by a pathologist was also made. The report stated the tissue "shows a unicellular tumor composed of small cells of the size of lymphoblasts in nests and masses beneath the

epithelium. Small lymphocytes are scattered along the vascular and fibrous septa. The tumor resembles a reticulum cell sarcoma of humans or a malignant lymphoma. It does not resemble a mast cell tumor of dogs and the pattern, while compatible with seminoma or melanoma, is not quite right for either."

Toxoplasmosis and Mongolism

Approximately one child in 600, in Denmark, is a mongol. Heredity is believed not to be a factor. Three cases of mongolism were associated with toxoplasmosis, which suggests that others may be also. Mongolism is believed to be due to infection during the first three months of gestation. (Women in early pregnancy are warned to avoid contact with any animals.)—*J. Am. M.A., Dec. 1, 1956.*

Hormones Recovered from Feces.—Estrogens were found in the feces of sheep after diethylstilbestrol had been given subcutaneously and from both sheep and cattle when these hormones had been fed as recommended. However, the quantity was not sufficient to impair reproduction in gilts following such cattle.—*J. Anim. Sci., Nov., 1956.*

Hormone Balance and Litter Size.—When gilts were fed alfalfa at the Ohio Experiment Station, their average litter size was increased by 1 pig over those fed the same ration without alfalfa, but with all known ingredients of alfalfa added. When stilbestrol was added to these rations, it had no effect on the litter size of the gilts fed alfalfa but those not fed alfalfa produced fewer ova and had a higher embryo loss. This may indicate that some feeds contain enough hormones to disrupt normal embryo survival and that certain feeds, such as alfalfa, may prevent this harmful effect.—*Farm J., Dec., 1956.*

Effect of Sex Hormones on Roosters.—When groups of young roosters of breeding age were injected twice weekly with progesterone (20 mg.), or diethylstilbestrol (5 mg.), or with both drugs, their bodyweights were not affected significantly. After 12 weeks, the birds were killed and the testes were examined. Progesterone depressed the mating behavior, the testes weight, and the number of spermatozoa. With diethylstilbestrol alone or with progesterone, mating behavior was not affected, testes weights were depressed, and no spermatozoa were present. Diethylstilbestrol significantly increased carcass fatness.—*Poult. Sci., Nov., 1956.*

The Insemination of Hens.—The main objections to large-scale artificial insemination of hens have been the labor costs and the weekly disturbance of the birds. However, in single-deck laying cages, which are being increasingly used, the hens are easily accessible with little disturbance. At first, the hens were removed from the cage for insemination. The bird, held in one hand in a horizontal position, was pressed against the operator's side while fingers of the other hand were pressed above and below the vent to evert the oviduct. The second operator inserted a small (tuberculin) syringe into the everted oviduct but ejected the semen only after all pressure had been released and the oviduct had returned to the normal position.

In the new technique, the hen is left in the cage but her legs are pulled through the door or between bars so that the posterior portion of the sternum is pressed against some object such as the feed trough in the cage; the second hand is used to open the vent. With the latter method, two men can inseminate 350 hens an hour, 12 per cent more than when the birds are removed from the cage, and the fertility rate has been higher. Neither method has had an adverse effect on egg production.—*Poult. Sci., Nov., 1956.*

Monovular Twin Chickens.—Twin female chicks, at the nineteenth day of incubation and normally developed, were found in a single-yolked egg—a rare occurrence.—*World's Poult. Sci. J., Oct., 1956.*

Whale Meat and Mink Breeding.—When two groups of mink, 30 females and 10 males each, were fed the same ration except that one contained 42 per cent whale meat, the other 42 per cent horse meat, there was no significant difference in their sexual activity, fertility, size of litters, or weight of young at weaning time.—*Am. Fur Breeder, Dec., 1956.*

The Enhancement of Virus Pneumonia of Pigs by the Migration of *Ascaris Suum* Larvae

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IN RECENT YEARS, considerable interest has been stimulated by reports on the incidence of virus pneumonia of pigs (VPP).[1,2] Much of this pneumonia was formerly believed to be caused by the migration of *Ascaris suum* larvae and was termed Ascaris pneumonia. Betts,[3] however, reported, in 1954, that massive numbers of migrating larvae in virus pneumonia-free pigs were incapable of producing lobar pneumonia. This report is substantiated by studies[4] in this laboratory by feeding infective Ascaris eggs to disease-free pigs. Much pneumonia of swine has been attributed to the Pasteurella and pleuropneumonia-like organisms (PPLO) frequently isolated from pig lungs. Recent reports[5,6] indicate that Pasteurella and PPLO are incapable of establishing in the pig lung without the assistance of VPP virus. These organisms were probably present as secondary invaders.

The virus of VPP is an indigenous agent which can infect all ages of swine from newborn to adults. As an inapparent infection, it can persist indefinitely and can be isolated from lungs with and without macroscopic lesions.[2] Virus pneumonia has been experimentally produced[9] in naturally farrowed, virus pneumonia-free pigs. At this laboratory, VPP has been established in disease-free pigs taken by hysterectomy but without the severity observed in most field cases. The following is a report of an attempt to determine one of the factors which influences VPP, enhances the disease, and produces the characteristic symptoms and pathology which are often found in field cases.

MATERIALS AND METHODS

Ascarid Larvae.—The infective Ascaris eggs came from worms obtained at an abattoir. The uteri were removed and minced with shears. The eggs were separated by pressing the minced tissue through several thicknesses of gauze. The concentrated eggs were then mixed with granular charcoal and incubated in a covered dish for 72 days at 27 C. The culture was stirred frequently to aerate the mixture. Following the 72-day incubation, the mixture was stored at 4 C.

Egg counts[7] indicated that each gram of the charcoal and egg mixture contained 50,000 eggs. Therefore, for administration, 2 Gm. of the mixture for each pig was washed through a tea strainer and the eggs concentrated by centrifugation. The concentrated eggs were resuspended in 10 ml. of water, counted, and treated with 1,000 units of penicillin and 1,000 μg. of streptomycin per milliliter.

The egg suspensions were administered by stomach tube and a 20 ml. hypodermic syringe, followed by rinsing to assure the full 100,000 egg dose per pig. The egg culture used was 83 days old for trial 1 and 111 days for trial 2. Eggs fed to mice prior to each trial produced pneumonia.

VPP Virus.—Strain NB12, isolated in this laboratory from lung material obtained from a Nebraska farm pig brought to the University for diagnosis, was used throughout the experiments. It had been passed serially 12 times by intranasal instillation in disease-free pigs.

In preparation for inoculation, the VPP-infected lung material was minced with ground glass in a mortar, diluted 1:10 by weight with a buffered salt solution, centrifuged at 3,000 r.p.m. for 30 minutes in a refrigerated centrifuge, and the supernatant treated with 1,000 units of penicillin and 1,000 μg. of streptomycin per milliliter at refrigerator temperature for one hour. This material was then diluted 1 to 1,000 and 5 ml. was given intranasally with the pig under light ether anesthesia. The virus material was protected from the direct light by wrapping the test tubes with black paper.

The test pigs were taken by hysterectomy and kept in individual isolation units throughout the experiments.[8] They were fed a maximum of 12 oz. per day of a maintenance ration of milk, chicken eggs, and minerals which permitted fair growth but no storage of fats.

The pigs were observed several times daily until necropsy three weeks after virus inoculation.

RESULTS

A diagrammatic comparison of two separate trials is shown (fig. 1). Two of the the 4 virus control pigs (VPP only) had lesions typical of the lung consolidation found in disease-free pigs inoculated with virus of

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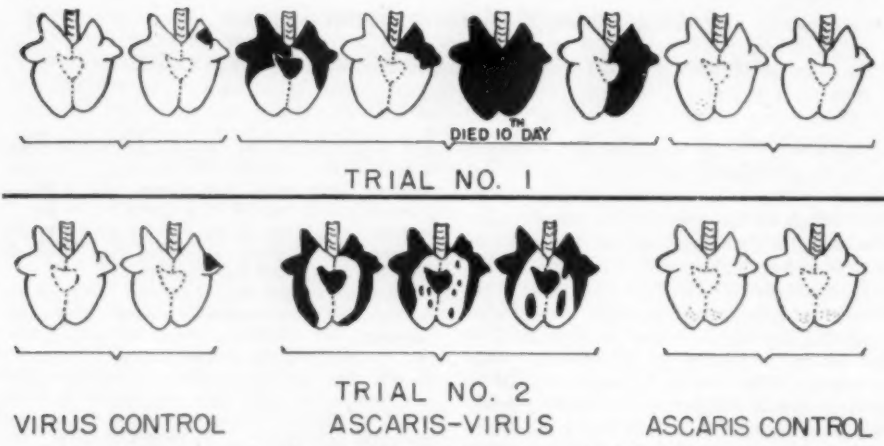

Fig. 1—Diagrammatic comparison showing the intense pneumonia following migration of Ascaris suum through VPP-infected pig lungs.

VPP. These lesions were small, clearly defined, and plum colored. The other 2 virus control pigs showed no lung lesions. The pigs receiving VPP virus alone did not cough or show symptoms and their growth compared favorably with other pigs under similar conditions.

The 7 pigs receiving Ascaris eggs followed five days later with VPP virus (Ascaris + virus) showed approximately a

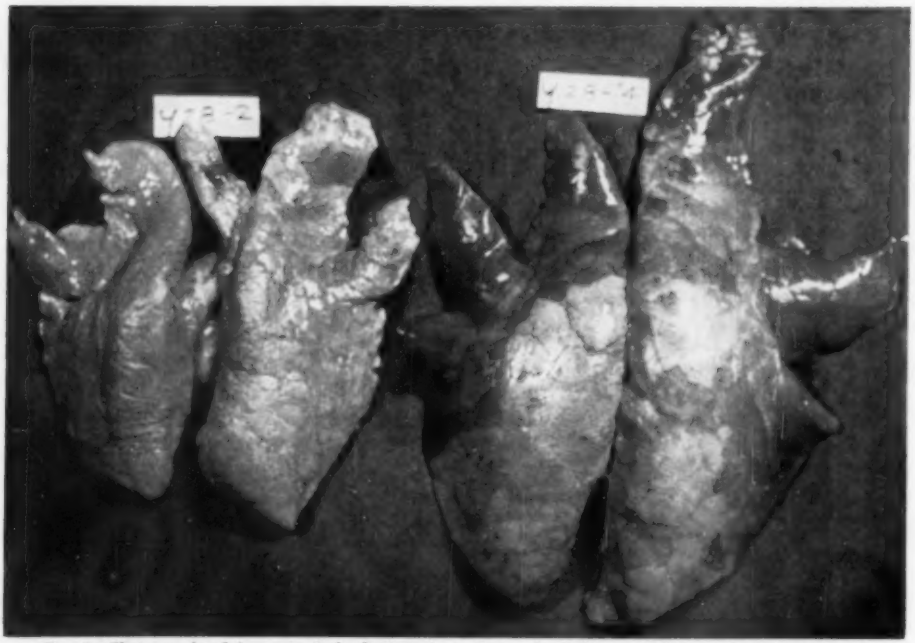

Fig. 2—Photograph of lungs typical of pigs given virus only (left) and of pigs given Ascaris and virus, showing the extended lesions and swelling of VPP enhanced by Ascaris migration.

tenfold increase in lung consolidation over the virus controls. The lungs of the pigs given Ascaris + virus were larger than the lungs of control pigs given virus or Ascaris only. This increase ranged from a slight swelling to two times normal with most of the lungs being approximately one and one-half times the size of either the Ascaris or virus control lungs.

The pigs given Ascaris + virus, as well as the control pigs given Ascaris, coughed and thumped between the seventh and tenth days. At this time, they went off feed for one to two days then returned to normal and showed no more external symptoms. One pig given Ascaris + virus in trial 1 died of pneumonia and on examination was found to have approximately 14,000 larvae in the lungs and trachea. No larvae were found in the lungs of the remaining pigs.

The 4 control pigs given Ascaris only also thumped, coughed, and were off feed between the seventh and tenth days but at necropsy, three weeks later, no lung consolidation was found. Several of the lungs had small pinpoint hemorrhages from the larval migration still visible on the lower tips of the diaphragmatic lobes.

A photograph (fig. 2) compares the lungs from 2 pigs in trial 1. The clearly defined areas of consolidation and the marked swelling of the lungs of pigs given Ascaris + virus are typical of those shown in both trials.

The lungs from the pigs in trial 2 were examined bacteriologically and were found negative.

DISCUSSION

The results of this study indicate that it is difficult to experimentally produce the disease VPP in as severe a form as is found in nature. For example, 2 of the 4 pigs which received the virus only developed lesions typical of VPP. The remaining 2 failed to develop any macroscopic lung lesions. As reported,[9] this lack of correlation between presence and absence of lesions is not uncommon in VPP-infected pigs having poor growth and low feed efficiency typical of VPP. It has also been reported[5] that many lungs designated as grossly normal at necropsy showed changes typical of VPP microscopically. The typical natural disease is probably not produced by the virus of VPP alone but is caused by two or more agents. For example, the 7 pigs given VPP virus during the Ascaris migration developed a tenfold increase in the lung consolidation more nearly characteristic of the disease as seen in many field cases.

The enhancement of virus by the migration of larval *A. suum* increases the importance of control measures for the herd with a history of ascariasis. Ascarids must be controlled to reduce the effect of VPP or any other agent capable of invading with them. The application of the new piperazine compounds,[10] or other effective anthelmintics, represents a possible means of controlling *A. suum* by planned periodic treatment. In order to prevent spreading of the eggs, *A. suum* should not be permitted to mature within the host. About 70 days are required for *A. suum* to reach maturity. Thus, if the market pigs are treated at 2 and 4 months of age and the brood stock at bimonthly intervals, the worms would not mature and no new eggs would be deposited on the soil. This program of planned treatment would lower the number of infective Ascaris eggs available and eventually eliminate Ascaris from the herd.

The intensified VPP plus the coughing caused by the migrating larvae may greatly increase the amount of virus made airborne to infect other pigs or the attendants, should the virus be pathogenic for man.

The migration of larval *A. suum* through the pig lungs may be utilized in the isolation of the virus of VPP from the tissues or body wastes in both classic and inapparent infections. It might also be of value in establishing other respiratory agents both natural and foreign to the pig. Thus, the baby pig could be used as the experimental host for study of diseases for which there is currently no satisfactory host available. These studies, as previously suggested,[5] must of necessity be done with disease-free pigs raised in strict isolation.

SUMMARY

Experimental evidence indicates that pigs inoculated with VPP during the migration of the larvae of *Ascaris suum* through the lungs showed lung consolidation ten times as extensive as in pigs which received only VPP virus. The lung lesions of pigs given Ascaris + virus were typical of those seen in more severe field cases. It is, therefore, recommended that measures be taken to control ascariasis to reduce the effect of VPP. The use of migrating *A. suum* as an

aid for the isolation of VPP and other respiratory diseases is suggested.

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The Clinical Picture of Salt Poisoning of Swine

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Swine with diagnosed or suspected cases of salt poisoning are occasionally received at this laboratory. Since the syndrome of salt poisoning resembles many of the diseases involving the central nervous system, it was considered desirable that a clinical test be found which could be used as a diagnostic tool for salt poisoning.

Both experimental and field cases of salt poisoning in swine have been described,[1] including the histopathological changes and the increase in the serum chloride and sodium levels. In another report,[2] no change was noticed in chloride or sodium levels in the blood of swine experimentally poisoned with salt. A rapid increase of blood chloride was also found[3] in a ruminant given salt through a rumen fistula.

Although the effects of high sodium chloride intake on blood chloride and sodium levels in swine have been reported as differing, it was believed that one or both of these indexes would be of value as a diagnostic tool. Salt poisoning was, therefore, experimentally produced to determine its effect on the blood chloride and sodium levels.

PROCEDURE

In November, 1955, 6 pigs, ranging in weight from 15.5 to 54.5 lb., were placed on a ration of ground yellow corn (60 lb.), ground oats (15 lb.), tankage (10 lb.), cotton seed meal (10 lb.), and alfalfa leaf meal (5 lb.). A mineral mixture, consisting of equal parts of steamed bone meal, limestone, and sodium chloride, was given free choice to the control lot of 3 pigs. The other 3 pigs were given only steamed bone meal and limestone in an effort to produce a sodium chloride-starved condition. Ample fresh water was available at all times.

After three months on this regimen, the smallest pig on the sodium chloride-free ration was deprived of feed and water for 12 hours, then given 5 lb. of feed containing about 5 oz. (6%) of sodium chloride daily. The only water offered was that added to the feed to make a swill. This pig developed signs of poisoning and was killed after five days on the trial. The other 2 pigs were then treated in a similar manner, developed symptoms of salt poisoning, and were killed after 16 days on the trial.

Blood was obtained[4] daily from all 6 pigs, collected in tubes containing dry potassium oxalate as an anticoagulant, and immediately centrifuged. Determinations were made of the plasma sodium[5] and chloride.[6] Hematocrit and leukocyte counts were made by the conventional methods.

RESULTS

The 3 pigs on the 6 per cent sodium chloride ration exhibited signs of salt poisoning similar to those reported by other investigators, e.g., weakness, nervousness, teeth chomping, and stiffness in the hindquarters.

Blood Picture.—The average plasma chloride and sodium values for the 3 poi-

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TABLE I—Effect of High Sodium Chloride Intake on Plasma Chloride and Sodium of Pigs

Pig No.	Chloride		Sodium	
	mEq*/liter	mg.%†	mEq/liter	mg.%
1 (av. 5 days)	138.8	485.8	160.1	368.3
2 (av. 16 days)	126.0	441.0	159.5	366.9
3 (av. 16 days)	132.8	464.8	163.5	376.1
Average	132.5	463.8	161.0	370.4
Control average	101.1	353.9	135.6	311.9

*mEq=milliequivalents. †mg.%=milligrams per 100 milliliters.

soned pigs are tabulated (table 1). Their combined averages, when compared with the average plasma chloride and sodium values of the 3 control pigs, show an increase in both chloride and sodium in the experimentally poisoned pigs. This increase became apparent after one day on the high sodium chloride diet and remained elevated, with only slight daily variations, to the end of the trial.

Throughout the trial, the hematocrit and leukocyte count values remained essentially normal.

SUMMARY AND CONCLUSIONS

Salt poisoning was experimentally produced in 3 pigs. The symptoms resembled those reported by other investigators.

Pigs fed a ration containing 6 per cent of sodium chloride showed an increase over the controls of about 30 per cent for plasma chloride, about 20 per cent for plasma sodium.

These results suggest that plasma chloride or plasma sodium, or both, may be useful, clinically, in the diagnosis of salt poisoning of swine and in differentiating it from other diseases with a similar syndrome.

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Arsanilic Acid Poisoning in Swine

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C. K. ROE, D.V.M., M.S.
Guelph, Ontario

The sodium salt of arsanilic acid, first prepared in 1863, was the first organic arsenical to be used in experimental trypanosomiasis.[1] In common with other pentavalent organic arsenicals, it is toxic to protozoans, especially the more highly developed forms, and its chief therapeutic application has been in sleeping sickness of man.

In 1949, it was reported[2] that organic arsenicals promote growth when added to the ration of "normal" animals. Since that time, arsanilic acid has had wide use as an additive in poultry and swine feeds at various recommended levels, usually from 25 to 45 p.p.m. The mechanism of growth promotion has not been explained; although reduction of the pentavalent arsenic acid to the trivalent arsenoso increases the bacteriostatic properties, it appears to destroy the growth-promoting factors.[3] From this it would seem that growth promotion is a property of arsanilic acid which is independent of its ability to suppress intestinal organisms.

Originally considered to be virtually nontoxic, arsanilic acid was found capable of producing acute and chronic poisoning in man and animals. The lesions in animals vary with the species[4]; dogs, for example, show mainly renal hemorrhages, whereas, in cats, the chief lesions occur in the brain and spinal cord. In animals as well as in man, arsanilic acid can produce blindness by degeneration of the optic nerve and retinal ganglia,[5,6] in addition to degenerative changes in brain tissue. It has been reported[7] that optic lesions were produced by pentavalent arsenical compounds in which an amino or a substituted amino group was in the para-position to the arsenic. This effect was not observed when the arsenic and nitrogen were in the ortho- or meta-position.

HISTORY AND CLINICAL DATA

In January, 1956, a report of a disease in a herd of pigs, characterized by central nervous disturbances, was received at the Ontario Veterinary College. The affected

From the Department of Medicine and Surgery, Ontario Veterinary College, Guelph.

animals consisted of three groups of 10 pigs each which were penned in widely separated areas in a barn. They ranged from 50 to 150 lb. in weight and were receiving a commercial grower ration. The remainder of the herd consisted of 70 mature and nursing swine which were maintained in the same barn. These were fed a sow or starter ration and were unaffected. Management in the herd was excellent.

The affected groups had appeared normal until the introduction of a fresh batch of grower ration containing arsanilic acid. Within a week, signs of central nervous disorder began and progressively increased in severity over a four-day period. The animals exhibited varying degrees of incoordination, and some became blind. Consciousness, temperature, and appetite were not significantly affected.

The ration was changed and within four days the symptoms alleviated. The condition appeared to have run its course in eight days and the affected pigs made uneventful recoveries. Some animals remained blind but the owner was able to bring all of them to marketable condition without undue time loss. No deaths could be attributed to the feed additive.

One animal was slaughtered during the initial stages of the disease. No significant lesions were observed on gross examination. Detailed examination of the brain was not conducted, however. No pathogenic organisms were demonstrated in the spleen, liver, kidney, or ingesta.

ANALYSES

The arsanilic acid content of the feed was determined by the Association of Official Agricultural Chemists' method. The same method, slightly modified, was used for the analyses of tissues. This technique is based upon acid aqueous extraction of the arsanilic acid and production of a colored complex by diazotization and coupling. Since other nitrogen-containing compounds, which may couple when diazotized, are present in feeds and tissues, values were established for "normal" samples. The fiducial interval ($x \pm t\ 0.05(Sx)$) for the liver was 10.0 ± 2; for the kidney, 7.5 ± 0.9, for the brain, 3.6 ± 0.2; and for two nonarsenic-containing commercial rations, 22.5 ± 1. These values were used as blanks and, where applicable, subtracted from the results of the test samples. A T-test indicated that there was no significant difference between bovine and porcine brain, liver, or kidney. The total arsenic levels for each sample were determined also by the Gutzeit technique. The results are shown (table 1).

TABLE 1—Parts Per Million of Arsenic as Arsanilic Acid in the Rations and Livers of Pigs

	Grower			
Sow ration	Sample 1	Sample 2	Starter	Liver
0	450	660	0	11

DISCUSSION

Toxic effects were produced within one week after feeding a ration containing approximately 15 times the level of arsanilic acid recommended for growth promotion in swine.[9] The symptoms observed in the pigs resembled those described in cats.

It has been reported that the differences in effects correspond with the distribution of arsenic. Cats exhibit nervous symptoms and the arsenic is deposited mainly in the nervous tissue, whereas dogs show renal hemorrhages and, in this species, arsenic is deposited chiefly in the parenchymatous organs.[10] If there is a parallelism between symptoms and tissue deposition, it would be expected that, in pigs, the highest arsenic levels would be found in the nerve tissue. It is regrettable that, in this case, the liver was the only organ submitted for toxicological analysis.

Although the toxicity of the organic arsenics is considerably lower than that of the inorganic forms, when absorption exceeds excretion, the nonexcreted fraction is probably stored in a partially oxidized pentavalent form.[11] It is still toxic and capable of causing cumulative poisoning, even though it is no longer parasiticidal.

SUMMARY

Pigs showed signs of poisoning after being fed approximately 15 times the recommended level of arsanilic acid for a week. The symptoms, lesions, and chemical analyses are discussed.

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What Is Your Diagnosis?

Because of the interest in veterinary radiology, a case history and accompanying radiographs depicting a diagnostic problem are usually published in each issue of the JOURNAL.

Make your diagnosis from the picture below—then turn the page ▶

Figure 1

History.—A male Siamese cat, 3 months old, was lame in the right hindleg. A plantodorsal radiograph of the hindlegs was taken through the region of the stifles.

(Diagnosis and findings are reported on next page)

Here Is the Diagnosis

(Continued from preceding page)

Diagnosis.—Lateral luxation of the right patella of the cat.

Comments.—The absence of inflammation and the degree of fixation found when surgical repair was performed indicated that this was probably a congenital anomaly.

Fig. 2—(a)This is a radiograph, lateral view, of the right stifle region. Notice the malposition of the patella (arrows); (b) a radiograph, lateral view, of the left stifle showing the patella in normal position.

This case report was submitted by Dr. Schebitz, professor, Faculty of Veterinary School, Cairo University, Cairo, Egypt.

An Allergic Condition in Jersey Cows

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IN A PERIOD of 19 months, this writer has observed 13 cows with an allergic-type reaction apparently associated with cessation of milking due to approaching parturition.

Usually, the allergic response developed 18 to 24 hours after the cow was last milked. All affected animals showed severe urticarious lesions and most of them showed accompanying respiratory distress. The teats and vulva seemed to be especially affected.

The condition has been observed in Jersey cows from 2 to 11 years old only. The husbandry practices have varied greatly. The usual pasture in this area is irrigated clover and rye grasses, mixed. The rations consist of cow beets, carrots, commercial grain mixes, alfalfa, oat, and clover-rye grass hays. Affected animals have not all been fed all of these feedstuffs, nor has any one of the mentioned feeds been a consistent part of their rations. With two exceptions, this was the first time the cows had been affected. The condition has been seen in all seasons and in both pasture and stall feeding.

The usual treatment has been 5 cc. of pyrahistine* intravenously and 5 to 10 cc. subcutaneously. After treatment, the respiratory distress usually subsides within one hour and the urticaria disappears in four to six hours. The condition of 1 cow, treated with 200 mg. of meticorten† intramuscularly, was worse after eight hours. When then given 10 cc. of pyrahistine intravenously, her respiratory distress was alleviated in about two hours and the urticaria subsided in about 12 hours. To date, no losses have occurred in treated animals. Milking alone gives no apparent relief. Three interesting case histories follow.

CASE REPORTS

Case 1.—On March 9, 1956, a cow showed this allergic response when she was being "dried up" but she responded to treatment. In approximately five weeks, she calved and immediately developed parturient paresis. Her calf was removed and the cow was treated with 250 cc. of a mixed solution of calcium chloride (12%) and magnesium chloride (6%). About 12 hours later (18 hours after calving), the client reported that "the cow has hives." She was then given 5 cc. of pyrahistine intravenously and 5 cc. subcutaneously, 500 cc. of parcal,** and was milked. She soon recovered.

Case 2.—A first-calf heifer, which had been lactating about seven months, had gotten into the wrong field the night of July 21, 1956, and was not milked the following morning. That evening, she was completely recumbent with severe dyspnea and extreme urticaria over the entire body. She was propped up and given 5 cc. of pyrahistine intravenously and 5 cc. subcutaneously. In one hour, she was breathing easier, but it required 36 hours for the urticaria to completely subside.

Case 3.—A cow,[2] 8 years old, had milked without interruption for three successive lactations prior to 1955. At each approaching parturition, the owner had tried to stop milking her. Each time, she developed this condition in 24 to 36 hours but responded to antihistamine injections.

One veteran cattle exhibitor stated that he had observed the condition on two different occasions while "bagging cows for judging" at the state fair.

DISCUSSION

Allergy is defined as a reaction which occurs when an antigen is administered parenterally to an individual whose cells have been sensitized to this specific antigen.[5]

Allergies are occasionally seen in cows but many recover spontaneously. Known causes of allergic responses include pollens, serums, drugs, various feedstuffs, oils, resins, and immunizing agents. These products occasionally produce allergic responses in both domestic animals and man. Feed and management would seem to be eliminated as causes by the fact that the affected cows were on different feeds and that, to date, no farm has had 2 cows affected. Since the condition occurs through-

Dr. Brewer is a general practitioner in Arcata, Calif.

*Pyrahistine (thenylpyramine hydrochloride), Pitman-Moore Co., Indianapolis, Ind.

†Meticorten (prednisone), Schering Corporation, Bloomfield, N. J.

**Parcal (borated calcium and magnesium gluconate with dextrose), Pitman-Moore Co., Indianapolis, Ind.

out the year, seasonal influences and photosensitization likewise seem not to have been a factor.

Its occurrence in Jerseys alone would seem to indicate some breed predisposition. Since Jersey cows usually produce milk slightly higher in protein content than other cows, it seems possible that when 1 animal is not milked for an extended period of time, some of the milk protein within the udder could undergo changes and then be resorbed into the blood stream and trigger the allergic response. With two exceptions, this condition has not recurred, suggesting that the sensitiveness is not permanent.

SUMMARY AND CONCLUSIONS

An allergic condition is reported in 13 Jersey cows 18 to 24 hours after they were last milked.

The symptoms are severe urticaria and usually some dyspnea.

Recovery is complete and rapid when antihistamines are given parenterally.

Feeds, climate, age, and husbandry do not appear to be influential factors.

The occurrence of the condition to date in Jerseys alone suggests that the higher protein content of their milk might be a factor.

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The Hotis Test for Streptococci

The Hotis test results on milk samples from individual quarters of cows in four herds were compared with the incidence of infection and types of microorganisms involved as shown by cultural and physiological tests.

In a herd which was infected with *Streptococcus agalactiae*, the Hotis test detected 82 per cent of the infected quarters. In herds which were free of *Str. agalactiae*, the Hotis test was of limited value in detecting infected quarters. In three herds free of *Str. agalactiae*, most of the udder infections and clinical mastitis were due to *Streptococcus uberis* or *Streptococcus dysgalactiae*. Clinical mastitis developed from 28 per cent of the established udder infections as detected by bacteriological tests.—[*Ben T. Throop, E. W. Swanson, and J. O. Mundt: The Efficiency of the Hotis Test in the Identification of Streptococcic Infections of the Udder. Am. J. Vet. Res., 18, (Jan., 1957): 93-96.*]

Aleutian Mink Disease

This highly fatal disease which is confined almost entirely to mutations of the Aleutian-Sapphire mink, affects chiefly the liver and kidney. Once considered as possibly being leptospirosis, it is now believed to be due to a virus which affects no other species, not even chicken embryos or laboratory animals.

It is characterized by hemorrhage from the nose, mouth, and intestine, as well as by anemia and a lowered resistance to other infections. It can be differentiated at necropsy from lipidosis, the chief cause of loss in mink, by the greatly enlarged spleen and by changes in the kidneys which are enlarged and often mottled with white spots. The liver is enlarged and brownish red whereas, in lipidosis, it is smaller and of an orange hue. The disease responds to no therapy whereas lipidosis, which is believed to be a nutritional condition causing a fatty necrosis, does respond to treatment. —*C. F. Helmboldt and E. L. Jungherr, Storrs, Conn. in Nat. Fur News, Dec., 1956.*

Inducing Mutation in Viruses.—Known genetic changes in the chemical structure of viruses have been induced at the University of California. This was done by making substitute chemicals available, altering the fundamental structure of the ribonucleic acid of the virus. The rate of mutation was about 1,000 times greater than normal and the mutants produced mutant offspring. This suggests the possibility of treating disease with chemicals which would change pathogenic viruses into harmless ones.—*Sci. News Letter, Sept. 9, 1956.*

The Diagnosis and Differential Diagnosis of Traumatic Reticulitis in the Cow

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ONLY CONDITIONS within the author's personal experience and causing, or nearly causing, incorrect diagnosis are described. They have been seen over almost two decades and during the course of a few hundred rumenotomies. Some of the observations have not, to the author's knowledge, been recorded before.

As certain tests for pain will be referred to often, their use will be discussed first. When the spinous processes are grasped tightly, the animal either curves the spine ventrally or strongly resists this tendency; (1) all the structures attached to the ventral surface of the spine are stretched, and pain in the spine or just below it will be aggravated as in spondylitis and nephrolithiasis; (2) the ventral abdominal wall will be tensed and pressure will be exerted on the organs in contact with or near it, e.g., in traumatic reticulitis and fracture of the sternum; and (3) the diaphragm will be fixed, resulting in an alteration in the breathing rhythm and bringing the accessory respiratory muscles into play. The nature of the grunting will thus change and the false impression might be created that pain is increased in the lower abdomen or chest, e.g., in myocarditis, endocarditis, and pulmonary emphysema.

Mild pressure on or behind the xiphoid process by means of a transversely placed pole has a local effect only, whereas hard pressure can be made to move the reticulum, liver, and abomasum, as well as causing a dorsal spinal curvature. This helps in the determination of the seat of pain. As indicated, there is also a secondary effect on respiration by alteration of the weight distribution of the organs. When lesions in the abdomen are laterally placed, there will be no detectable effect as in lateral rumenal peritonitis.

THE DIAGNOSIS OF TRAUMATIC RETICULITIS

The first consideration is to obtain a good history. This naturally varies as to whether the type of case is acute, subacute, or chronic.

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Anamnesis.—In the acute type, the onset of symptoms is sudden. The animal grunts, has a capricious appetite, and the milk yield is significantly less. The onset of illness may be a sequel to sudden, severe increase in abdominal pressure, as in parturition.

In the subacute type, the symptoms are similar but often less pronounced, with the result that the information given might be vague.

In chronic traumatic reticulitis, grunting may be so slight as to escape the owner's notice. The animal does not do well and gradually declines in milk yield and condition.

Symptomatology.—In the acute type, the animal is usually alert. Thoracic kyphosis and lumbar lordosis are seen. This may be so slight as to resemble normal conformation. Grunting is noticed. Only if the pain is severe, does the animal express anxiety and distress. Stiffness of the forelegs and abduction of the elbows are often seen. This is to bring the secondary respiratory muscles into play to minimize the movements of the diaphragm, especially where the injury to the diaphragm is either ventral, anterior, or lateral. The appetite is capricious. A symptom, which is almost pathognomonic, is eating, even greedily, and then suddenly ceasing, followed by grunting. After a short while, this process is repeated. The pain is due to rumenal peristalsis initiated by mastication and deglutition. Regurgitation, sometimes so violent that the ingesta splashes against the wall, occasionally takes place. This probably occurs when the foreign body irritates the area where the rumination reflex is initiated. Bloating is occasionally found when there is a swelling in the neighborhood of the esophageal groove. According to workers at the Onderstepoort Veterinary Research Institute, eructation is always preceded by a relaxation of the reticulum so that the fluid level will fall enough to clear the cardia and permit the escape of gas. Adhesions of the reticulum can thus lead to bloating. Also, when the right ventral branch of the vagus nerve is

damaged, as can happen in traumatic reticulitis, bloating occurs.

The temperature is usually normal but, if fever is present, it seldom exceeds 105 F. and indicates peritonitis. The heart beat is normal, except when there is a slight acceleration due to great pain. Tachycardia exceeding 90 per minute without fever indicates a foreign body penetrating in the direction of the heart. If the pericardium is involved even slightly, the heart rate increases. The respirations continue to be normal, except when the rhythm is disturbed by grunting or the rate is increased by pain. The rumenal movements are normal or decreased. In the former case, the consistency of the ingesta is normal and, in the latter, often doughy. Feces show similar variations. If grunting is synchronous with rumenal peristalsis, it excludes conditions in the differential diagnosis unassociated with the forestomach. Pinching the thoracic spine elicits grunting. The cow refuses to flex the spine and may even kick and jump. Pressure on the xiphoid process may exact the same response, or it may bring relief when the foreign body is transversely placed and the pressure eases the pain by increasing the side-to-side diameter of the abdomen. The differential blood count is of limited, if any, value. If made too soon after the onset, there is no response, neutrophilia may be transient and easily missed and, if neutrophilia is established, it can be due to infection elsewhere.

There is no great difference between the subacute type and the acute type, except that the cattle in this stage are more prone to complications because of the longer illness.

In the chronic type, the majority of cases tend to pass beyond the aid of the veterinarian due to complications. In uncomplicated traumatic reticulitis, the animal's state of body may vary between good and emaciation, the appetite showing variation related to the extent of the lesions. Milk production is markedly below normal. The danger always exists that further pathological processes may be set up, leading to death. In the uncomplicated case, general clinical signs are absent. Kyphosis is usually pronounced and some stiffness of the forequarters may be detected. Tests for pain are resented. Spontaneous grunting can be produced by the tests. In another type of case, the animal may show vague symptoms of digestive origin only. Later, signs of traumatic pericarditis appear. The reticulum is not sensitive in its upper half, in contrast to its lower half. These cases may be due to a high penetration of the foreign body.

The Metal Detector.—This instrument seems to have no place in the examination of the cow for traumatic reticulitis. If it indicates the presence of metal, it may be something harmless, and if it fails to reveal metal, trauma could still have been caused by a sharp nonmetallic object. The metal detector also can not localize a piece of metal to determine whether it has pierced an organ. The clinician, therefore, still has to rely solely on his clinical judgment for a diagnosis.

DIFFERENTIAL DIAGNOSIS

The following conditions are concerned in the differential diagnosis and each one may have grunting as a symptom. In all cases where local infection is suspected, the left kidney, the one within reach, should be palpated. Enlargement usually indicates glomerulonephritis, which often arises through the excretion of toxins formed in abscesses. This is supportive evidence of suppuration in the body.

Conditions of the Spine.—Abscess of the Spine, Spondylitis, and Spinal Ankylosis. —When the animal walks, there is rigidity of the part of the spine affected, provided major nerves and the spinal cord are intact. If not intact, paretic signs are seen. Tapping with a plexor up and down the spine helps in localizing the site of the lesion. An abscess on the lumbar spine may be palpated rectally. In ankylosis, the spine is as stiff as a ramrod. Flexion is either painful or impossible.

Conditions Due to Trauma by Sharp Foreign Bodies.—Traumatic Pericarditis. —The importance in determining whether pericarditis accompanies reticulitis is that the prognosis becomes so grave that surgery is not justified except on the most valuable animals. It is a simple matter to diagnose advanced pericarditis. The difficulty arises when there is only localized pericarditis. If the penetrating foreign body injures the lung, the diagnosis is simplified. If so low as to miss the lung, the only symptom, apart from those of reticulitis, is tachycardia. If the onset has been associated with a sudden increase in intra-abdominal pressure, the suspicion of early pericarditis is strengthened. Even at

this early stage, pericardiotomy in addition to rumenotomy may be necessary.

Traumatic Pneumonia.—This condition has a bearing on the prognosis after rumenotomy. Pneumonic signs in the cardiac region, on the left side, as indicated by auscultation and percussion, are strongly indicative if superimposed on the symptoms of reticulitis.

Traumatic Rumenitis.—That part of the dorsal rumenal sac that lies between the reticulum and the ventral sac is motile and small enough to allow a foreign body to penetrate its wall, in which case the cow will show vague symptoms of reticulitis. The tests for pain will be indefinite. With deep percussion, the cow shows pain above and behind the reticulum.

Traumatic Hepatitis.—The symptoms of traumatic hepatitis are superimposed on those of reticulitis, *i.e.*, there is accentuation of pain, loss of condition, and malaise. Liver abscesses in the region of the esophageal groove may cause chronic tympanites. A positive plasma, van den Bergh test is of value.

Traumatic Splenitis.—In this condition, the foreign body may penetrate laterally and high so it may enter a less sensitive part of the reticular wall. The structure of the spleen is not favorable to localization of infection, so that septicemia readily occurs, associated with septic polyarthritis and hyperpyrexia. Tapping of the splenic area is painful. Splenic puncture may be necessary.

Nontraumatic Thoracic Pathology.—Endocarditis.—When this condition is secondary, the symptoms will be linked with those of the primary condition. Gangrenous pneumonia, as a result of septic emboli, may occur. There is always tachycardia and, sometimes, dyspnea and cyanosis. Tests for pain are negative.

Myocarditis and Myocardial Failure.—Tachycardia, which may become extreme with slight exertion, is always present in myocarditis. The cause of grunting is obscure, possibly angina pectoris. Tests for pain are negative.

Lung Abscess.—This is often the sequel to pneumonia and may be accompanied by a cough. Only when the abscess involves the pleura will symptoms resemble those of reticulitis. A pleural rub may be detected. Percussion may show dullness and, if forceful, may cause coughing. Tests for pain are usually positive if forceful enough. Aseptic puncture of the area suspected may be required.

Fractured Sternum.—The resemblance of symptoms of a fractured sternum to those of reticulitis is amazing, but the fracture will be easily detected by local manual examination.

Nontraumatic Abdominal Pathology.—Rumenitis.—General acute rumenitis causes grunting, malaise, complete atony, anorexia and, sometimes, bloat.

Impaction of the Omasum.—Untreated impaction of the omasum is always associated with that of the rumen. Generally, severe constipation may be present, but occasionally there is diarrhea. Dehydration and depression are shown in all cases, and tests for pain are negative.

Abomasitis and Sand in the Abomasum.—A history of geophagia helps in the diagnosis of this condition. When sufficient sand has been ingested, there is complete inappetence, grinding of the teeth, kicking toward the abdomen, and pain with pressure over the abomasum. Considerable hemorrhage might take place into the abomasum, resulting in dark feces. Washed feces may show sand.

Peritonitis.—The peritonitis referred to here occurs on the lateral surface of the rumen; it is not uncommon, although the cause is obscure. When chronic, it becomes subclinical. Rumenal movements are partly or wholly suppressed and tapping over the affected area causes the animal to flinch. Pinching over the withers causes accentuated grunting, but pressure over the xiphoid process does not cause a pain reaction.

Liver Abscess.—Signs of pain are most likely when the abscess involves the peritoneum, as infection buried in the parenchyma is usually clinically silent. When doing a rumenotomy, the author's main fear is that he will find a liver abscess unassociated with trauma. Pressure over the xiphoid process may indicate pain.

Nephritis, Pyelitis and Nephrolithiasis.—Sometimes the symptoms of these conditions may closely resemble those of reticulitis, but stiffness in the gait is more pronounced in the hind- than in fore-quarters. Apart from urinary changes, pain will be shown on percussion of the kidney region. Rectal palpation of the kidney is painful. The significance of renal enlargement due to glomerulonephritis has been referred to.

CONCLUSION

The diagnosis of traumatic reticulitis is not difficult, as a rule, but some unsuspected conditions may at times closely resemble it, possibly causing erroneous diagnoses and embarrassment at operation. All the conditions listed have at various times posed the author some diagnostic problems.

[Differential diagnosis from two viral diseases, ephemeral fever (three-day stiff sickness), and lumpy skin disease was deleted from this paper since they are not recognized here.—ED.]

Edema Disease in Swine

Thrifty pigs, 6 to 16 weeks old, became ill in eastern Germany, after having been fed wheat, wheat bran, rye bran, or leftovers of bread. Some were also nursing. For a day or two, they showed diarrhea without loss of appetite, then developed incoordination, progressive paralysis, and edema of the eyelids. The temperature was usually normal or subnormal and the animal was usually completely paralyzed or dead in a few hours. The best pigs in the litter were usually the first affected. At necropsy, all showed edema of the subcutis on the head and in the colic mesentery. The condition was epidemiologically similar to an infectious gastroenteritis. It was suggested that a conditionally pathogenic *Vibrio coli* could be responsible. Some considered it to be an enterotoxemia.

The condition was reported to have been treated with penicillin and various sulfonamides with varying success. The author found these, as well as other drugs and erysipelas serum, of no value. Exercise, withholding food for 24 hours, a nutrient vitamin supplement, and substituting oats or barley for other grains seemed beneficial. It is suggested that this may be a metabolic disease due to an unbalanced ration.—*D. Hagen in Monatsh. f. Vet.-med., 11, Nov. 15, 1956.*

Sulfaquinoxaline Toxicity in Chicks

When sulfaquinoxaline was added to the rations for young chickens at various levels, those that received the 0.0125 per cent level showed no ill effects. However, at levels of 0.025 per cent or above, lesions found histologically included degeneration of liver cells and of kidney tubules, proliferation of bile duct epithelium, signs of depressed thyroid activity, and a decrease of lymphoid islands in the bone marrow. There was little change in the blood and no hemorrhages, indicating that the role of sulfaquinoxaline in the hemorrhage syndrome is minor. At the highest levels, feed consumption and weight gains were decreased.—*Poult. Sci., Nov., 1956.*

Vitamin D Affects Calcium Absorption in Chicks.—When calcium was injected intramuscularly, it was deposited in the bones of vitamin D-deficient chicks nearly as well as in normal chicks; but when fed, it was absorbed from the intestine much more slowly and incompletely and a higher percentage of the calcium was immediately excreted in the feces than from chicks receiving vitamin D. When segments of intestine were isolated, the absorption of calcium into the epithelial cells was found to be much greater in the chicks which received adequate vitamin D. Apparently, the primary value of vitamin D in calcium metabolism is its effect on absorption from the intestine.—*Poult. Sci., Nov., 1956.*

Calcium Absorption and Parturient Paresis.—By using tracer doses of calcium and phosphorus, blood studies in mature cows showed that the absorption of both from the digestive tract was increased when massive doses of vitamin D were given orally. The rise of blood phosphorus preceded the rise in blood calcium. Radiocalcium disappeared from the blood of lactating cows faster than from nonlactating cows.—*J. Dai. Sci., Dec., 1956.*

Water Economy in Sheep in the Tropics.—The water intake, output, and distribution of 60 young Merino sheep were studied during two summers in Australia where for six months the mean temperature was 95 F. and the maximum 115. In the sun at noon, when the temperature may be up to 107 F., the weather-soiled tips of the wool may be 190 F. and the skin only 97. When the terminal 1 cm. of the wool was clipped, the new tip temperature was lowered 30 to 36 F. When the air temperature was 100 F., shorn sheep might pant 230 times per minute, while the unshorn panted about 108 times per minute.

The Merino sheep can survive almost as much dehydration as the camel.—*Nature, Aug. 11, 1956.*

The Use of the Hemagglutination-Inhibition Test for the Control of PPLO Infection in Poultry

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THE PURPOSE of this paper is to explain in some detail a method of control of infections in poultry caused by the pathogenic pleuropneumonia-like organisms (PPLO). This method is based entirely upon the premise that there is no basic immunity in these diseases and that complete eradication of PPLO is the only means of control worth considering. To this end, a serological technique capable of detecting infected flocks has been developed; this test is based on the fact that the PPLO can cause agglutination of chicken erythrocytes and that the serums of infected birds can inhibit this reaction.[1]

It is agreed that the PPLO are the continuing link of infection in chronic respiratory disease which permit this disease to perpetuate itself from generation to generation (fig. 1). This does not preclude the presence of saprophytic PPLO as postulated.[2-4] A review of the effects of PPLO on avian mortality and morbidity has been published[5] and it was suggested, on the basis of etiology and clinical signs, that these diseases be broken down into pleuropneumonia coryza, chronic respiratory disease (CRD), and air sac infection. In general, PPLO cause 5 to 10 per cent mortality in embryos during the hatching period. Most of this is due to asphyxiation at the time of pipping. Such affected groups show a varying degree of morbidity and mortality, usually not exceeding 5 per cent during the first week of life.

In growing birds, uncomplicated PPLO infection manifests itself as a transient coryza; however, this disease frequently becomes complicated with other infections, such as infectious bronchitis or Newcastle disease. In more severe cases, usually as the debilitation caused by dual PPLO and respiratory virus infection proceeds, secondary bacteria from the intestinal tract invade the general system. If the secondary bacteria belong to the Salmonella or Pasteurella groups, then the resulting mortality is increased proportionally. In adults, the disease caused by PPLO is confined to a mild coryza which persists for a few weeks but usually the chronic state of the disease exists by this time with essentially no external disease manifestations.

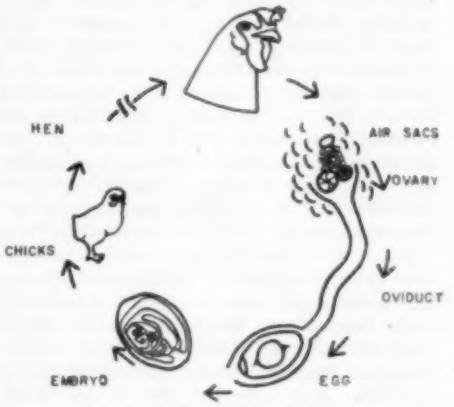

Fig. 1—Cycle of PPLO infection.

The published reports of many workers[6-8] confirm the fact that the PPLO are perpetuated mainly by the transovarian passage of the organisms in infected carrier hens. The PPLO are not virulent enough to kill all of the infected embryos nor do they kill all the infected chicks which hatch, a reasonable degree of peaceful coexistence having been achieved between the pathogen and the host.[5] The carrier chicks, in turn, infect their penmates during the growing period by means of aerosol spread. The rate of this spread is aided considerably by the presence of unrelated respiratory viruses. Thereafter, the infection assumes a chronic form and a small percentage of the adult birds remain active shedders of the infection through the egg. It appears also that the organisms are excreted from the respiratory tract because transmission to normal contact birds is possible by means of air spread.[9,10]

The fact that many carriers can be found

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TABLE I—Incidence of PPLO as Shown by Hemagglutination-Inhibition Antibodies in 1,708 Untreated Flocks in Ontario

Age (wk.)	Flocks	Neg.	Pos.	Per cent pos.
0-3	79	72	7	8.9
3-6	61	49	12	19.7
6-9	97	53	44	45.4
9-12	573	256	317	55.4
Adults	569	247	349	58.6
Breeders	329	152	177	53.8

suggests that under natural conditions no worthwhile immunity is produced. This would seem to reduce the possibility of developing useful vaccines. Furthermore, the main feature of PPLO infection with which we are concerned, namely CRD, is a disease complex which, to date, can only be broken by the complete elimination of PPLO. Thus, while the PPLO do not in themselves cause much disease, in combination with other known pathogens they play an important role in the pathogenesis of such diseases as CRD and air sac infection.

In view of the mild nature of the infection, present methods of transportation and the widespread use of certain strains of birds throughout the world, it would be surprising if the disease was not widely disseminated. Now that a serological test is available, it is apparent that PPLO infections in poultry are widely disseminated. Serums from chickens in many sections of North America have been found positive, as have specimens from South and Central America and Europe. The results of serum surveys of unselected flocks in Ontario are shown (table 1).

SEROLOGICAL TESTS

Several tests for serological activity of the PPLO have been devised, but only two, the hemagglutination-inhibition (HI)[3] test and the tube-agglutination test,[21] seem to be sufficiently accurate to be worthy of mention. In order for any test of this nature to succeed, it is essential to have a carefully standardized and stable antigen. The HI antigen can be prepared in a dry form, which is stable for months, and can be standardized by its combining power with dried stable known-positive serums. This latter test of sensitivity is of considerable importance because, as observed by the authors, the results of PPLO serological tests can be influenced to the point where false positive and negative results can be obtained by the improper use of the number of units of antigen.

The development of the HI antibody response in chickens, naturally and artificially infected with PPLO with and without the presence of other viruses, has been reported elsewhere.[3,8,39] The older the bird, the more difficult it is to interpret the serological findings on individual birds, because of the low serum titers, but the test still remains a useful tool to evaluate the PPLO status of the flock as a whole. The HI response becomes positive usually within 14 days of infection or about four to six days after the first clinical signs of the disease appear.

The actual technique of the test involves the prep-

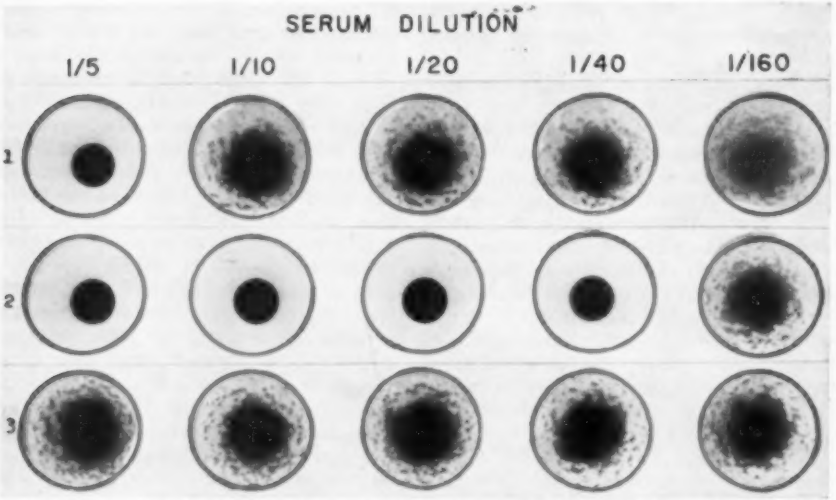

Fig. 2—Hemagglutination-inhibition test against the pleuropneumonia-like organisms—1=titer of 5; 2=titer of 40; 3=titer of <5 (negative control).

aration of serial dilutions of the serums in the holes of a drilled leucite plate. It is convenient to make twofold dilutions in 0.5-ml. amounts and then to add 1 ml. of reconstituted antigen which contains 4 hemagglutinating units, the antigen having been previously standardized against a standard serum of known potency. After a minimum incubation period of 15 minutes at 20 C., 0.5 ml. of 3 per cent chicken erythrocytes are added. The results can be read as early as 45 minutes later but, because the cells do not fall in, the results can be read up to 24 hours later. The results of a typical test series are shown (fig. 2).

FIELD STUDIES

In 1953, the first PPLO-free chicks were obtained by injecting 200 mg. of streptomycin into infected breeder hens and then collecting eggs for a two-week period, starting ten days after the injection.[12] While it was not known at the time, it became apparent later that the eggs were collected at about the most opportune time with respect to the egg transmission of PPLO. It is believed that in no case does streptomycin effect a 100 per cent recovery in the flock or even the destruction of all of the PPLO in any particular bird. However, the transmission rate is lowered sufficiently so that small groups will be free of infection. For example, if the transmission rate is reduced to 1:1,000, and if an average group of 1,000 of these chicks is divided into five groups, only one group of the five will become infected. On the basis of other studies on transmission rate in nature, there does not seem to be any means of predicting what the actual transmission rate will be and rates varying as widely as 1 to 2 and 1:1,500 have been observed.

It soon became apparent that there was an absolute correlation between clinical health in these PPLO-clean flocks and the fact that the serums from all such birds were negative to the PPLO-HI test. The first two clean breeder flocks to be established were bled at monthly intervals throughout their life, and remained negative to the test at all times. In fact, about 100 of the original 700 birds are still alive (3 yr. later), are still negative serologically, and at no time have they or their progeny shown any signs of PPLO infection in any of its various forms.

As the program expanded and the poultrymen gained confidence in the test, the number of birds produced and set out under commercial conditions was as follows: 1954, 75,000; 1955, 136,000; and to date in 1956, 550,000. In contrast to the general serological picture (table 1), all of the clean stock has remained serologically and clinically negative to market age (in most cases 10 weeks). Even though certain operators would have infected stock on the premises, the PPLO-free chicks would go through the broiler-growing period without developing signs of CRD.

On the basis of three years' experience with field testing and over 35,000 samples tested, it seems that the most opportune time to test a flock is at 12 weeks of age, at pullorum testing time, and at intervals of three months thereafter. More frequent tests might be indicated by the clinical appearance of the birds.

It is important to keep a good check on the clinical health of the breeder flocks because it is possible to have a negative test during the early stages of an attack of the disease, particularly if the number of blood samples tested is small. While it is reassuring and convenient to test all of the birds at pullorum-testing time, it would appear, on the basis of over 12,000 individual tests, that if 10 per cent of the flock is negative, then the whole flock is negative.

In adult flocks which undergo an attack of Newcastle disease or infectious bronchitis after they have reached maturity, a small percentage of the birds show a positive titer of 5 to 10. This low titer is transient and is apparently not related to invasion of the flock by pathogenic PPLO. Presumably, these low titers are caused by a temporary invasion of the damaged epithelial tissues by saprophytic pleuropneumonia-like organisms. Despite repeated attempts at isolation, no PPLO of any kind have been isolated from such cases. In any event, these titers disappear completely within a month.

SUMMARY

By means of the hemagglutination-inhibition test for avian PPLO, it is possible to identify breeding flocks which are free of PPLO infection. Such flocks have been found to produce chicks which do not come down with PPLO infection (CRD included) under the usual conditions of field exposure in Ontario.

The advantages of a stable and standardized antigen for this test can not be overemphasized because it is possible to mis-

interpret the results if the test is not properly controlled. The test itself is apparently free of false positives, except in the case of the adult birds which become infected with infectious bronchitis. In this event, the false positives are few in number and disappear completely in four weeks.

It is recommended that prospective clean breeding flocks be tested at 12 weeks, at pullorum testing time and, again, every three months.

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Aldrin and Dieldrin in the Animal Body.—Studies indicate that aldrin is almost completely converted to dieldrin in the animal body regardless of the site of entry. These toxicants are frequently used as pesticides. Dieldrin is stored in the body without chemical change.—*J. Agric. and Food Chem., Nov., 1956.*

Treatment of Retinoblastoma

Fifty children, from 2 months to 7 years old, were treated for retinoblastoma with a combination of radiotherapy and triethylene melamine. The radiation dosage was usually 2,400 r and the drug was given by mouth or intramuscularly or, in advanced cases, by instillation into the internal carotid artery. The tumor was arrested and vision was preserved in 12 of 33 children given the drug by mouth; in seven of eight when given intramuscularly; and in two of nine when instilled into the carotid artery. The results were better than in the past when radiotherapy was used alone. Therapeutic doses of triethylene melamine produced hematological depression, so complete blood cell and platelet counts are necessary to avoid toxic reactions.—*J.Am.M.A., Dec. 8, 1956.*

Curare in Severe Tetanus.—Especially severe tetanus occurred in a 7-year-old boy with a forehead wound. Since he was allergic to antitetanic serum, the only treatment was with antibiotics. Trismus appeared in four days and for 26 days he was given paralyzing doses of d-tubocurarine chloride, 15 mg. intravenously, repeated as soon as muscular twitching recurred (20 to 30 min.). Respiration was maintained with a respiratory pump. Chloral hydrate was given to prevent memory of the ordeal, antibiotics to control infections, and promethazine to minimize allergic reactions. He was given 72 oz. of milk plus glucose daily, and made a complete recovery.—*J.Am.M.A., Dec. 1, 1956.*

Transmission of Human Warts.—In an orphanage, 25 per cent of the children developed warts over a period of 18 months. About 20 per cent of another group developed warts in a shorter period. Some strains of wart virus seem to be more communicable than others but this has not been proved.—*J.Am.M.A., Nov. 24, 1956.*

Ruminant-like Digestion in Marsupials

The herbivorous marsupial, Rottnest Island wallaby, weighing 4 to 10 lb., survives well under poor grazing conditions in Australia. It has a complex, sacculated stomach with an esophageal groove to bypass the sacculated region. However, the epithelium of most of the stomach is columnar with well-developed tubular glands. Like the ruminant, the stomach is large, the cecum is small, and the capacity ratio of stomach to large intestine is about 6 to 1. Bacterial digestion predominates, with 15 bacterial types comparable with those in the sheep rumen being present in the sacculated portion of the stomach. This suggests that the small marsupial may be a valuable laboratory animal for nutritionists working with ruminants.—*Nutr. Rev., Nov., 1956.*

Feeding Cooked Garbage to Swine

When swine were fed typical cooked residential garbage (heated to boiling for 30 min.), a ton, without supplement, produced 39 to 80 lb. of pork. Addition of 10 per cent barley increased the weight gains, 1 lb. of barley replacing 9 to 10 lb. of garbage. The addition of chlortetracycline increased both the weight gain and feed utilization.—*J. Anim. Sci., Nov., 1956.*

Selenium Poisoning in Swine Reduced by Arsenicals and Linseed Oil Meal.—In tests with weanling pigs on concrete floors, arsenilic acid (0.01%) protected against 13 p.p.m. of selenium (as sodium selenite). Organic arsenicals gave best protection when fed with linseed oil meal, perhaps because of the protective action of the mucin content. Chlortetracycline did not affect selenium toxicity.—*AFMA Nutr. Abstr., Nov., 1956.*

Proper Protein for Pregnant Gilts.—Gilts fed a 14.3 per cent protein ration during pregnancy raised 92.0 per cent of their pigs to weaning age, at the University of Minnesota, whereas gilts fed 10.7 per cent protein raised 77.0 per cent. There was no difference in the average litter size but baby pigs in the low-protein group were more subject to scours.—*Feed Bag, Dec., 1956.*

Starter rations for early weaned pigs should contain 17 or 18 per cent protein. Pigs weaned when 12 to 14 days old, at the University of Illinois, gained as well on a ration containing 18 per cent protein as on higher protein rations and better than those on lower protein rations.—*Feed Bag, Dec., 1956.*

Healthy Pigs Unaided by Antibiotics.—Healthy pigs in drylot and on feeds containing various levels of antibiotics showed no significant advantage in feed efficiency, rate of gain, or in back fat thickness, at the University of Kentucky, over control groups fed no antibiotics.—*Feed Bag, Dec., 1956.*

Nitrate Poisoning in Cows from Mangolds.—Three cows in Ireland became ill after eating freshly harvested mangolds. They recovered in two days when given 20 ml. of 4 per cent methylene blue. Since the nitrate content was 2.5 per cent, poisoning could occur when 60 lb. of the mangolds are eaten.—*Vet. Bull., Aug., 1956.*

Sheep Get More Nitrogen from Wheat.—Sheep obtained more nitrogen from young wheat hay than from alfalfa, in a test in Australia. The nitrogen content in the abomasum was greater than in the fodder, possibly due to addition from the saliva or gastric juice.—*Sci. News Letter, July 28, 1956.*

Feeding Organic Acids to Lambs.—When the salts of acetic, propionic, and the lactic acids were added to the rations of lambs at Wooster, Ohio, the rate of gain was not affected but 1 lb. of acid replaced 3 to 10 lb. of feed. The carcass showed no significant difference in quality but a flavor difference could be detected.—*AFMA Nutr. Abstr., Nov., 1956.*

Effect of Feed on Fat Quality in Geese.—Geese (in Russia) fed on barley for 12 days, then given 40 ml. of rapeseed oil daily for 16 days, then barley again for 12 days, showed changes in their subcutaneous and internal fat by the eighth day on each feed. On rapeseed oil, the fat had a lower melting point and a characteristic rapeseed odor which disappeared eight days after the oil was withdrawn.—*World's Poult. Sci. J., Oct., 1956.*

Editorial

"Noah's Ark" Series to Be Discontinued

The television series, "Noah's Ark," depicting veterinary medicine as the background for a human interest story, has failed to generate sufficient viewer appeal to make it attractive to commercial sponsors who place great faith in television ratings.

The March 5 showing will be the last telecast in so far as present programming is concerned.

Many will consider this a serious public relations loss to the veterinary profession and, of course, it will be a heavy financial loss to the producers—Mark VII, Ltd.

From a professional viewpoint, the program has had definite shortcomings. However, the sequences that were the least acceptable to members of our profession probably made little or no adverse impression on the average viewers. Most of us realize, or should, that the program was not designed primarily for veterinarians.

From a programming standpoint, the series was faced with a number of difficulties unusual to the rank and file of television programs. Only those who have attempted to devise methods of creating "glamour," human interest, and strong public appeal within the rigid confines of professional standards can fully appreciate the limitations placed on this type of story material. The fact that the producers of Noah's Ark steadfastly refrained from sensationalism, even though this might have enlarged the potential audience, is certainly commendable.

It is, perhaps, unfortunate that this series had its debut in many sections of the country at an hour as highly competitive for viewers as is 7:30 p.m., Tuesday, (CST). It is asking a great deal for a new and different venture to compete with such shows as Wyatt Earp and Phil Silvers.

While the discontinuation of Noah's Ark is a disappointment, the experience gained may result in the development of other programs which will suitably portray veterinary medicine. It takes time to establish a successful pattern, especially in a field as new to television as is veterinary medicine. We feel that the trial period for this first series was too short to get much more than professional reaction to the program.

It would be interesting to know the general public reaction to the program as reflected by the comments of clients. It is a "long shot" but, should there be sufficient protest directed to NBC about the discontinuation of "Noah's Ark," an avalanche of mail could bring it back, provided the demand was from the public and not only from the profession.

Parturition and Body Temperature

An interesting article on signs of impending calves in *Hoard's Dairyman* (Dec. 10, 1956) mentioned as an "infallible sign" that the cow's temperature will rise about 1 degree one to three days before, then drop about 2 degrees about 12 hours before calving. The article adds, however, that occasionally there is no temperature change. The JOURNAL reported (Feb. 1, 1956, p. 131) that the temperature of a bitch also may drop to 98 F. a few hours before whelping.

While the temperatures of cows or other animals at the time of parturition are seldom considered, many swine breeders and their lay advisors have for many years believed that a supposed "farrowing fever" was responsible for various problems which occur at farrowing time. However, since parturition is a physiological function, there is no obvious reason why, unless complicated by infection or inflammation, it should be accompanied by an abnormal temperature. (Temperatures taken on several hundred sows with dystocia were practically always normal.)

A regular rise in temperature prior to parturition would be chiefly of academic interest; it would probably be associated with some hormonal activity. If this is true, temperature changes of similar origin could also occur at or after parturition. At such times, a raised temperature would be of practical interest since it would be necessary to differentiate it from a fever due to inflammation, infection, or perhaps to absorption. (Nonseptic fever was frequently encountered in colts when castration wounds sealed too quickly and exudates accumulated in the scrotum.)

Because there are many possible complicating factors, normal postparturient temperature curves would be difficult to establish. However, if attainable, they would be of value to the practitioner. Does anyone have any accumulated observations on such to report?

ABSTRACTS

Pasteur vs. Flury Vaccine for Rabies

The Flury rabies virus, isolated in 1940, is a unique strain. No similar strains have ever been isolated. Our first studies indicated that this virus was anomalous; later, cross-immunization studies on rats and mice showed that Flury virus cross-immunized against standard rabies viruses. Is it not somewhat premature to use this virus as the main immunizing agent for the control of rabies?

Experiments show that a vaccine made from the phenolized brain of the biting animal may be used for the treatment of the bitten animal. Phenolized vaccines prepared from regional strains of rabies may be more satisfactory than those prepared from fixed Pasteur strains that have been passed through 2,000 to 3,000 passages.

Is there any reason to introduce an avianized product requiring 40 to 50 egg passages—180 or more for cattle?

Phenolized vaccines have been successfully used in pigs, cattle, horses, sheep, camels, and goats. More than 97,000 dogs have been vaccinated with fewer than 5 reacting. The statement that Flury vaccine produces lasting immunity has not been clearly proved. The reports of attempts to control rabies in Israel, Malaya, and South Africa by the use of Flury vaccine have been quite summarily prepared.

Flury virus passed through guinea pigs produces a marked encephalitis when injected into rabbits. Is there no danger of this encephalitis developing in other animals? Flury virus may regain its invasive powers in highly susceptible animals. Inactivated vaccines can not become reactivated.—[*P. Remlinger: Pasteur Vaccines and Flury Vaccine in Animal Vaccinations. Bull. Off. internat. des Epizoot., 45, (1956): 592-600.*]—J. P. SCOTT.

Endocrine-Controlled Defense Mechanism of Rabbit Uteri

A difference was found in the number of bacteria recovered from previously inoculated uteri of estrous and pseudopregnant rabbits which could not be accounted for by differences in the properties of the uterine secretions as culture mediums. The numbers of live *Escherichia coli* recovered at the end of four hours from intact uterine horns was a mean log of 6.54 for the estrous and 8.3 for the pseudopregnant rabbits. The difference between these was greater ($P<0.01$) than the difference found in completely excised horns of 8.22 for the estrous and 8.37 for the pseudopregnant rabbits. When heat-killed *Esch. coli* were injected into the lumen of one uterine horn of estrous and pseudopregnant rabbits to stimulate the defense mechanism and, 15 hours later, live *Esch. coli* were introduced into both horns of each rabbit, the mean log numbers of live *Esch. coli* recovered from the four classes of uterine horns after four hours were: sensitized estrous, 4.48; control estrous, 6.76; sensitized pseudopregnant, 6.01; and control pseudopregnant, 8.32.—[*H. W. Hawk, J. Simon, S. H. McNutt, and L. E. Casida: Investigations on the Endocrine-Controlled Defense Mechanism of Estrous and Pseudopregnant Rabbit Uteri. Am. J Vet. Res., 18, (Jan., 1957): 171-173.*]

Emulsion-Type Erysipelas Vaccine in Newborn Pigs

The swine erysipelas emulsion bacterin was shown to produce an immunogenic response in newborn pigs (4 to 14 days old) lasting at least eight months. Anti-swine erysipelas serum could be given simultaneously with this bacterin, apparently without affecting the nature of the immune response.

The bacterin tended to cause an objectionable local reaction in about 60 per cent of the pigs. It also caused the swine to develop a hypersensitivity to the proteins present in the bacterin. Several possible solutions to this problem were discussed. —[*F. M. Murdock and N. K. Jungk: An Emulsion Type Erysipelas Bacterin. II. Duration of Immunity Following Vaccination of Newborn Pigs. Am. J. Vet. Res., 18, (Jan., 1957): 126-132.*]

Effects of Antibiotics on Aspergillus Fumigatus

Using the hanging drop method, the authors report the results of testing eight antibiotics and two chemical drugs in various concentrations against *Aspergillus fumigatus in vitro*. Thus, penicillin was found to be totally inactive, whereas streptomycin, chlortetracycline, achromycin, oxytetracycline, chemicetine, chloromycetin, erythromycin, and potassium iodide have been proved fungistatic in concentrations up to 10.0 mg. per milliliter. On the contrary, mercuric iodide red has been proved to be fungistatic in concentrations up to 18.75 Gm. per milliliter and fungicidal above this concentration.—[*C. B. Tarlatzis, A. G. Panetsos, and P. N. Dragonas: The Effects of Some Antibiotics and Chemical Drugs on the Growth in Vitro of Aspergillus Fumigatus. Am. J. Vet. Res., 18, (Jan., 1957): 214-215.*]

A Rumen Fistula Modification

A one-step circular rumen fistula operation which can be used immediately was successful in 12 of 13 dairy cows.—[*J. O. Schnantz: A Rumen Fistula Modification. Am. J. Vet. Res., 18, (Jan., 1957): 73-75.*]

FOREIGN ABSTRACTS

Serotherapy for Rabies

Statistics indicate that the mortality of persons bitten by rabid dogs is about 60 per cent for the untreated and 30 per cent for persons given Pasteur treatment.

In Teheran, a rabid wolf bit 29 people, 18 of

them in the head. Of the 13 treated with anti-rabies serum and Pasteur vaccine, only one died. Of five patients treated with Pasteur vaccine alone, three died; this is the proportion expected from previous experience.

For many years, attempts have been made to develop a satisfactory anti-rabies serum, using sheep extensively. The titer from sheep may be extremely high but is usually variable in value. Difficulties in the production of this antiserum have prevented its extensive use. Horses may also produce a valuable anti-rabies serum.

Recently, a commercial antiserum has been prepared from rabbits. This antiserum, associated with Pasteur vaccine, is highly successful. The production of larger volumes in horses may soon be possible.—[*P. Remlinger: Should Antirabies Vaccine Therapy Be Accompanied by Serotherapy? Bull. Off. internat. des Epizoot., 45, (1956): 601-609.*]—J. P. SCOTT.

BOOKS AND REPORTS

Reproduction Problems in Animals

The *Monatsbefte für Veterinärmedizin* has published a special edition of 20 papers on problems relating to reproduction, which were presented before the 1955 scientific session of veterinarians, under the auspices of the Livestock Board of Health of the German Democratic Republic. The papers are of interest to those engaged in research and practice in the fields of reproduction. Their value is not necessarily that they reveal things that are new to the veterinary profession, but that they report the opinions of specialists where one must expect different patterns of thinking and methods of approach.

The discipline incurred in the digestion of such manuscripts is challenging and inspiring.

The titles of the paper include: New and Practical Experience in Combating Sterility Due to Hyperkeratosis Caused by Toxins Found in Commercial Feeds; The Influence of Different Land Areas upon Reproduction; The Importance of Bacterial Flora in the Genital Tracts of Cows; Observations Relative to the Influence of Brucellosis and Tuberculosis upon Reproduction; New Way of Combating Brucellosis; Vitamin E and Its Influence in Combating Brucellosis; Studies of Vibriosis—Biochemical, Serological, and Clinical; Trichomoniasis in Bulls; Pyocyaneous Problems; Penis and Preputial Papillomatosis; Breeding Problems in Sheep; Effect of Hyaluronidase upon Number of Sperm and Fertility; and Causes of Sterility in Mares.—[*Problems Relating to Reproduction in Animals. 20 papers. Monatsh. f. Vet.-med. (Sonderheft 1), 1956.*]—H. E. KINGMAN, Sr.

Diagnostic Procedures for Virus and Rickettsial Diseases

The objective of this book is the presentation of technical diagnostic procedures. It is primarily the work of authorities in the various subjects and also of leading investigators and designers of diagnostic procedures for diseases of man, including several zoonoses. New chapters include "General Principles Underlying Laboratory Diagnosis of Virus and Rickettsial Infections," "ECHO Viruses, Tissue Culture Methods for the Cultivation of Poliomyelitis and Other Viruses," "The Coxsackie Viruses," and "Miscellaneous Virus Diseases."

The length of the volume has been increased from 347 to 596 pages and 14 full-page illustrations have been added. The book is well indexed. —[*Diagnostic Procedures for Virus and Rickettsial Diseases. By Thomas Francis, Jr., Editor. 2nd ed. 596 pages. 50 tables. 43 figures. American Public Health Association, Inc., New York, N. Y. 1956. Price $7.50.*]

Common Sense Book of Puppy and Dog Care

This book includes all the information most dog owners will need to raise and care for their pets. It begins much as do the modern baby books. The first chapter tells what to expect in the development of a pup, how to care for and train it, what and how much it should eat, and the importance of the veterinarian in its life. Subsequent chapters deal with further growth stages and old age; basic nutrition; general care and grooming; how to teach it simple tricks; and first aid.

The final section gives the history, description, and an illustration for each of the recognized breeds.—[*The Common Sense Book of Puppy and Dog Care. By Harry Miller. Bantam Books, Inc., New York, N. Y., 1956. Price 35 cents.*]

AVMA Group Insurance Program Was Launched February 4

All AVMA members in participating states received complete details and application blanks by mail shortly after February 4.

Inquiries should be directed to:

AVMA Group Insurance Trust
Mitchell Hutchinson, C. L. U., Administrator
Professional Society Group Insurance Co.
120 South LaSalle St., Chicago 3, Ill.

Pennsylvania Civil Service Announces Examinations for Veterinary and Related Positions

The Pennsylvania State Civil Service Commission has announced that examinations will be held late in March to establish eligible lists for use in making appointments in the State Department of Agriculture for a number of positions. These include veterinarians in three classes, with salary ranges from $6,090 to $7,772 and $9,011 to $11,501; veterinary pathologist, salary range $6,090 to $7,772; poultry pathologist, $6,390 to $8,163; and entomologists in three classes with salaries from $4,329 to $5,529 to $6,390 to $8,163.

The examinations will consist of three parts: written tests, experience-education evaluation, and oral interviews. The written examinations are scheduled for March 30, 1957, in Allentown, Clearfield, Erie, Harrisburg, Johnstown, Philadelphia, Pittsburgh, Scranton, and Williamsport. Arrangements will be made to administer tests to out-of-state residents at places within their states.

Applications can be obtained from the State Civil Service Commission, Box 569, Capitol Park, Harrisburg, Pa., and must be filed not later than March 8, 1957. Applicants eligible for admission to examinations will be notified of exact time and place to report.

American Veterinary Radiology Society to Meet

The American Radiology Society will meet Feb. 24, 1957, in Chicago, at the LaSalle Hotel. The date for this meeting is just prior to the meeting of the Illinois V.M.A. Dr. William C. Glenney, Ardmore, Pa., is president of the American Veterinary Radiology Society.

New England Association Elects Officers

The New England V.M.A., at its annual meeting in Hartford, Conn., elected the following officers: president, Dr. David Hopkins, Brattleboro, Vt.; vice-president, Dr. George C. Cilley, Jr., Concord, N. H.; secretary-treasurer, Dr. C. Lawrence Blakely, Boston, Mass.

STATE BOARD EXAMINATIONS

State Board Approves Mid-Course Examinations in Anatomy, Physiology, and Biochemistry.—Under date of Dec. 19, 1956, Mr. James O. Hoyle, secretary of the New York State Board of Veterinary Medical Examiners, announced that students in approved veterinary schools may make application for written examinations in the following subjects at the end of their second year: anatomy, physiology, and biochemistry.

Further information relative to necessary application forms may be obtained by interested students from John W. Paige, chief, Bureau of Examinations and Registrations, State Education Department, 23 South Pearl St., Albany, N.Y.

Veterinary-Nutrition Relations Committee

Mutual problems experienced by the feed industry nutritionist and the veterinarian are being brought into focus by a newly organized committee which includes representation from the Nutrition Council of the American Feed Manufacturers Association and from the American Association of Veterinary Nutritionists.

Front row (left to right)—Dr. Morris Erdheim, Dawe's Laboratories, Chicago, Ill., A.A.V.N. president; Marvin C. Wilkening, Alabama Flour Mills, Decatur, Ala., chairman, Nutrition Council Veterinary Relations Committee; Dr. R. E. Lubbehusen, Ralston Purina Company, St Louis, Mo., chairman, A.A.V.N. Public Relations Committee.

Second row—Dr. Roland Gessert, Federal Food and Drug Administration, Washington, D.C.; Dr. John A. Whiting, veterinary nutritionist, Kansas City, Mo.; Dr. Ruel E. Ward, Eastern States Farmers Exchange, West Springfield, Mass.; Dr. E. M. Gildow, Albers Milling Company, Seattle, Wash.; Robert Vohs, Ames Reliable Products Company, Ames, Iowa.

Third row—Dr. W. D. Pounden, Ohio Agricultural Experiment Station, Wooster, Ohio, AVMA Advisory Committee member to Nutrition Council; Elmer Modeer, Staley Milling Company, Kansas City, Mo.; Dr. John W. Cunkelman, Swift and Company, Chicago, Ill.; Dr. J. W. Nelson, Nutrena Mills, Minneapolis, Minn.; Dr. A. A. Heidebrecht, Paymaster Feeds, Abilene, Texas; and Dr. Roy E. Nichols, University of Wisconsin, Madison.

Called the Veterinary-Nutrition Relations Committee, the group is composed of members of the Public Relations Committee of the A.A.V.N. and members of the Veterinary Relations Committee of the Nutrition Council.

The Veterinary-Nutrition Relations Committee will have a rotating membership and will meet semiannually. The first formal meeting was held in Chicago, Nov. 27, 1956.

AMONG THE STATES AND PROVINCES

California

Alameda-Contra Costa Association.—The Alameda-Contra Costa V.M.A. met on Dec. 26, 1956, at the Robin Hood Inn, Oakland.

A film on the therapeutic use and physiology of sex hormones was shown, and Dr. Charles March of the Oakland S.P.C.A. discussed aspects of his work and its relation to veterinarians.

s/GEORGE H. MULLER, *Secretary.*

Colorado

Veterinarians and Feeder-Cattle Operators Meet.—A meeting of veterinarians and feeder-cattle operators was held in Greeley, Nov. 26, 1956.

The theme of the meeting was the question "Why is there such a variation in the cost of veterinary service for treatment of apparently similar diseases, especially when dealing with rhinotracheitis?"

Mr. George James, Weld County agricultural agent, served as moderator of a panel consisting of Mr. Martin Domke, president, Colorado Feeders Association; and Drs. William Brown, Fort Collins, Colo.; D. Mackey, Greeley; V. D. Stauffer, Arvada; William Harrison, Longmont; B. Frank, Sterling; E. Drake, Eaton; and J. Thimmig, Brighton.

Subjects covered by the various speakers included the economics of practice, differential diagnosis and its effect on cost, and facilities for handling cattle and the effect on cost.

Delaware

State Association.—The annual meeting of the Delaware V.M.A. was held in Dover, Dec. 12, 1956. Thirty-six members and guests were in attendance.

The program included a discussion on swine diseases and rabies by Dr. Robert V. Johnston, Indianapolis, Ind.; and Dr. Frank A. Todd, Washington, D.C., discussed livestock diseases.

Officers elected for the following year are E. F. Waller, president; A. P. Coogan, president-elect; and C. A. Woodhouse, secretary.

District of Columbia

District Association.—The District of Columbia V.M.A. held its second annual meeting on Nov. 20, 1956.

The program was held at the Walter Reed Army Institute of Research. Guest speakers included Drs. R. E. Shope, New York; C. W. Raker, Pennsylvania; and M. C. Liken, chief, Historical Research Division, Medical Museum, A.F.I.P.

At the evening dinner-dance, Brig. Gen. James A. McCallam, retired, and Col. Raymond Randall were awarded certificates for outstanding achievement.

s/CHARLES G. DURBIN, *Secretary.*

Florida

Ridge Association.—Newly elected officers of the Ridge V.M.A. of Florida for the coming year are Charles B. Plummer, Fort Myers, president; and John C. Haromy, Lake Wales, secretary-treasurer.

s/JOHN C. HAROMY, *Secretary.*

Georgia

State Association.—The seventh semiannual business meeting of the Georgia V.M.A. was held at Hotel Dempsey, Macon, Dec. 2, 1956, with 75 veterinarians attending.

A report on the brucellosis eradication program in Georgia was given by Dr. Chester Mikel, inspector in charge, ARS, U.S.D.A. It is hoped that Georgia will be brucellosis-free by 1960.

The next annual meeting of the Georgia V.M.A. will be held in Athens, June, 1957.

s/CHARLES C. RIFE, *Secretary.*

Idaho

Southwest Association.—The Southwest Idaho Veterinary Medical Association met for its regularly scheduled dinner meeting at the Homestead Inn in Nampa on Dec. 6, 1956.

The following speakers and their subjects were included in the program: W. J. Ewing, Committee Report on the Veterinary Practice Act; R. A. Brooks, Preliminary Report on the Use of Proteolytic Enzymes in Practice; and A. P. Schneider, state veterinarian, Summary of Reports at the Sanitary Meeting. Dr. O. L. Frost, president, moderated the discussions following the presentation of each report.

s/MICHAEL INVERSO, *Correspondent.*

Iowa

State Association.—The seventy-fifth annual meeting of the Iowa V.M.A. was held in Des Moines, Jan. 22-24, 1957.

Guest speakers included Drs. C. J. Bierschwal, Columbia, Mo.; Frank G. Fielder, Bloomfield, N. J.; Kenneth B. Haas, Jr., Kalamazoo, Mich.; L. M. Hutchings, Lafayette, Ind.; L. J. Hanson, St. Paul, Minn.; W. O. Kester (AVMA president), Washington, D.C.; D. R. Mackey, Greeley, Colo.; J. E. Mosier, Manhattan, Kan.; A. H. Quin, Kansas City, Mo.; Robert Sauter, Omaha, Neb.; Wm. L. Sippel, Tallahassee, Fla.; J. D. Wheat, Davis, Calif.; and E. A. Woelffer, Oconomowoc, Wis.

Mr. W. D. Knox, editor, *Hoard's Dairyman,* Fort Atkinson, Wis., and Dr. Kenneth B. Haas (Ph.D.), Chicago, Ill., were also guest speakers.

Kansas

District Meetings.—The Central District meeting was held at the Lassen Hotel in Wichita, Dec. 2, 1956. Mr. Lewis E. Harris was the guest speaker.

The Southeast District meeting was held at Hiatville, Nov. 4, 1956. The meeting program consisted of a clinic in which Drs. L. W. Richardson, Buford D. Winters, Fred Ogilvie, and Dick Koger demonstrated surgical procedures.

The Northeast District meeting was held at Manhattan on Dec. 9, 1956. Drs. Embert Coles, George Eberhart, John Erikson, and G. H. Mydland participated in the program.

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State Association.—The annual meeting of the Kansas V.M.A. was held Feb. 6-8, 1957, in Salina.

Guest speakers included Drs. E. H. Bohl, Columbus, Ohio; H. P. Callaway, Waverly, Mo.; H. J. Hill, Fort Collins, Colo.; C. H. Pals, Washington, D.C.; W. O. Kester (AVMA president), Washington, D.C.; T. H. Brasmer, Danville, Ill.; D. S. Steele, Minneapolis, Minn.; D. L. Coffin, New York, N.Y.

Oklahoma

Oklahoma County Association.—The newly elected officers, all of Oklahoma City, of the Oklahoma County V.M.A. are James M. Brown, president; D. B. Pellette, vice-president; and Forrest H. Stockton, secretary-treasurer.

s/C. H. FAUKS, *Resident Secretary.*

Pennsylvania

Conference for Veterinarians.—The fifty-seventh annual conference of veterinarians at the University of Pennsylvania was held January 8-9 at the School of Veterinary Medicine in Philadelphia.

Guest speakers included Drs. David E. Bartlett, Chicago, Ill.; Bernard F. Brennan, Westbury, N.Y.; Morris S. Cover, Newark, Del.; William F. Hoffman, Pittsburgh, Pa.; Jack O. Knowles, Miami, Fla.; William F. Riley, Jr., East Lansing, Mich.; Gunnar Rockborn, Stockholm, Sweden; H. J. Stafseth, East Lansing, Mich.; and F. F. Tenney, Peterborough, N.H.

Closed-circuit television in color was produced and sponsored through the courtesy of Smith, Kline, and French Laboratories.

Wisconsin

State Association.—The forty-first annual meeting of the Wisconsin V.M.A. was held at the Schroeder Hotel, Milwaukee, Jan. 9-11, 1957.

Out-of-state speakers were Lt. Col. F. D. Maurer, Washington, D.C., and Dr. G. W. Mather, St. Paul, Minn.

Governor Vernon W. Thomson delivered the annual banquet address entitled "State Government and Your Profession."

FOREIGN NEWS

Australia

Dr. Webster Elected President of Australian Association.—Dr. A. F. Webster was elected president of the Australian Veterinary Association. He graduated from Sidney University in 1935. The report of Dr. Webster's election, appearing in the October, 1956, issue of the *Australian Veterinary Journal,* had this to say: "Mr. Webster is one of the few practitioners who have been elected President, and members of the Association will be gratified that the Chair is occupied by as conscientious a man as Mr. Webster . . . ."

U. S. GOVERNMENT

Dr. Kieldsen Retires.—The retirement of Dr. Fred O. Kieldsen, effective Dec. 30, 1956, as inspector in charge of meat inspection, Los Angeles, Calif., has resulted in a number of transfers of veterinarians in charge of meat inspection stations throughout the United States.

Dr. Charles Barnes, inspector in charge at Ottumwa, Iowa, is succeeding Dr. Wolford J. Johnson at Salt Lake City, Utah; Dr. Johnson succeeds Dr. Frank R. Thorndike at Sioux City, Iowa; and Dr. Thorndike succeeds Dr. A. F. Eckert at San Francisco, Calif.

Dr. Eckert replaces Dr. F. O. Kieldsen at Los Angeles, Calif. Dr. Eckert graduated from Ontario Veterinary College in 1931, and has had meat inspection assignments in Chicago, Ill.; Omaha, Neb.; Miami, Okla.; Topeka, Kan.; and New York City, N.Y., prior to his appointment as inspector in charge at San Francisco in 1953.

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Dr. Bassett Transfers to Ottumwa, Iowa.—Dr. William H. Bassett, inspector in charge at Allentown, Pa., has been transferred and promoted as inspector in charge at Ottumwa, Iowa. He will succeed Dr. Charles Barnes who has been transferred to Salt Lake City, Utah.

Dr. Bassett graduated from Iowa State College, Ames, in 1935 with the D.V.M. degree. He has been a federal employee since 1935, and has worked in Oklahoma and California on brucellosis until 1937, when he was transferred to Omaha, Neb., as a meat inspector. Dr. Bassett served in the U.S. Army Veterinary Corps from 1950 to 1953 and upon returning to the Meat Inspection Branch was sent to Allentown, Pa., as inspector in charge. His promotion and transfer was effective on Dec. 30, 1956.

VETERINARY MILITARY SERVICE

Veterinary Officers Graduate.—Graduation ceremonies for the ninety-sixth class of veterinary officers attending the Army Medical Service Meat and Dairy Hygiene School were held Dec. 21, 1956.

Since the establishment of the school in November, 1940, at the Chicago Quartermaster Depot, 2,000 veterinary officers have completed the ten-week course of instruction for inspection of subsistence incident to procurement, storage, shipment, and issue to the Armed Forces.

Front row (left to right)—Major Wiggo Christensen, adjutant; Major George T. Dalziel, instructor; Lt. Col. Gordon W. Vacura, director; Lt. Col. Wayne D. Shipley, commandant; Major James B. Young, instructor; Major Roy W. Upham, instructor; Capt. Harrison S. Martin, instructor; M/Sgt. John F. Moore, assistant instructor.

Second row—First Lieutenants David A. Schoneweis, Ernest G. Boone, Jr., Frederick D. Wingert, Edwin G. Clampett, Joseph E. Landholm, Major Chaudhry Inayat-Ullah (Pakistan Army), First Lieutenants Walter F. Norvell, Fritz P. Gluckstein, Jude L. Swalley, Joseph E. Donavan, Jr.

Third row—First Lieutenants Jay J. Simmons, Marion R. Flowers, Ronald E. Hodoval, Martin Van Der Maaton, Harold P. Miller, Wendell L. Tarver, Frank C. Taylor, Charles E. Durland, Warren O. Hartman, Charles F. Reid.

Fourth row—First Lieutenants Stanley N. Wampler, Richard F. Dean, William M. Atkins, Jay E. Graber, Jack D. Railsback, William F. McCulloch, John B. Mulder, Albert W. Dickinson, III, Robert K. Dunton, Albert R. Danes.

Mr. C. G. Hegburg, Swift and Company; Major General H. R. McKenzie, executive director, Military Subsistence Supply Agency; and Dr. G. M. Dack, University of Chicago, participated in the graduation program.

DEATHS

Star indicates member of AVMA

★**John W. Childs** (COL '28), 59, Denver, Colo., died Dec. 2, 1956. Dr. Childs was state veterinarian of Colorado at the time of his death.

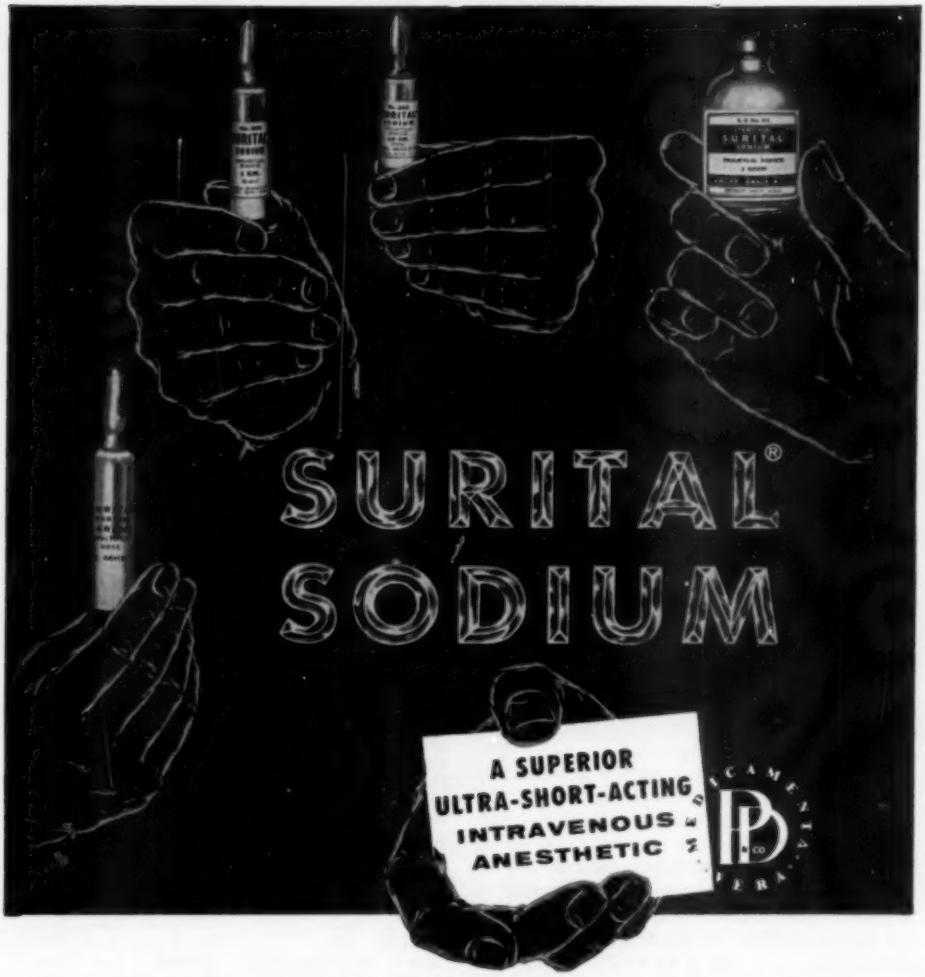
Dr. Childs was born in El Paso, Texas. He graduated from high school in Denver, Colo., in 1915, and attended Colorado A. & M. College before entering the Armed Forces during World War I.

Following his graduation from the School of Veterinary Medicine, Colorado A. & M. College, in 1928, Dr. Childs practiced in Oroville, Calif., for 18 years. He was admitted to the AVMA in 1936.

Dr. Childs is survived by his widow and three daughters.

★**Alfred E. Erickson** (GR '18), 67, died in Charlotte, Mich., on Oct. 19, 1956. Dr. Erickson served as secretary and president of the Capitol (Mich.) V.M.A. in 1926-27. Dr. Erickson joined the AVMA in 1926. He is survived by his widow.

★**L. R. Montgomery** (OSU '14), 67, Casselton, N. Dak., died Dec. 14, 1956. He was a member of the North Dakota V.M.A. Dr. Montgomery joined the AVMA in 1938.



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Principles of Ethics

During the past several years, the Committee on Ethics has considered a number of inquiries concerning interpretations and application of the Principles of Veterinary Medical Ethics of the American Veterinary Medical Association.

A series of discussions relating to various sections of the Principles will appear in subsequent issues of the JOURNAL.

Professional Deportment

Paragraph 5 of the Principles of Veterinary Medical Ethics admonishes the member as follows: "No member shall belittle or injure the professional standing of another member of the profession or unnecessarily condemn the character of his professional acts."

Within the confines of this one sentence lies the basis for all that is good in establishing a true measure of professional understanding among colleagues. Diplomacy reaches its severest test when we recognize the unfounded statements of the client as a detriment to all members of the profession, and we in turn offer positive argument to the contrary. It is not enough that we appear insensitive to the disquieting remarks, for to refrain from defense is but to give the appearance of tacit approval. To permit defamation of a colleague without reasonable protection certainly leaves the door open to future criticism of like kind for ourselves.

It is unthinkable for such discrepancies to be fathered by a representative of the society and, yet, as human beings, we can be capable of just this sort of base act if we unthinkingly relax our guard before the public eye. To impugn the character of a fellow veterinarian may have little effect on his evaluation of us, for he may never know. But we, the detractors, must live with our conscience of wrong in his behalf.

If we are to condemn the value of his services, then we must accept the responsibility for never committing the slightest breach of medical inaccuracy. This of course becomes an impossibilty on our part, for medicine is not an exact science. The charlatan does exist in our midst, and will continue to do so, but the remedy for his acts lies within the jurisdiction of the society and not in individual crusades before the public.

To have a friend, we must first be a friend to the fullest measure of our capabilities. Our neighboring veterinarians, in every branch of veterinary medical endeavor, have the same problems and ambitions in the fostering of a united profession. To all these, we personally owe the greatest respect in our power.

AVMA COMMITTEE ON ETHICS

Senate and House Committees, Eighty-Fifth Congress, of Interest to Veterinarians

The names of members of standing committees of both the Senate and House of Representatives of the Eighty-Fifth Congress are published on this page and succeeding pages. These are the committees that will handle legislation which may be of interest to the veterinary profession.

Senate Committees

AGRICULTURE AND FORESTRY

Democrats	Republicans
Allen J. Ellender, Chr. (La.)	George D. Aiken (Vt.)
Olin D. Johnston (S. Car.)	Milton R. Young (N. Dak.)
Spessard L. Holland (Fla.)	Edward J. Thye (Minn.)
James O. Eastland (Miss.)	B. B. Hickenlooper (Iowa)
Hubert H. Humphrey (Minn.)	Karl E. Mundt (S. Dak.)
W. Kerr Scott (N. Car.)	John J. Williams (Del.)
Stuart Symington (Mo.)	Andrew F. Schoeppel (Kan.)
Herman E. Talmadge (Ga.)	

APPROPRIATIONS

Democrats	Republicans
Carl Hayden, Chr. (Ariz.)	Styles Bridges (N.H.)
Richard B. Russell (Ga.)	Leverett Saltonstall (Mass.)
Dennis Chavez (N. Mex.)	Milton R. Young (N. Dak.)
Allen J. Ellender (La.)	W. F. Knowland (Calif.)
Lister Hill (Ala.)	Edward J. Thye (Minn.)
John L. McClellan (Ark.)	Jos. R. McCarthy (Wis.)
A. Willis Robertson (Va.)	Karl E. Mundt (S. Dak.)
Warren G. Magnuson (Wash.)	Margaret C. Smith (Me.)
Spessard L. Holland (Fla.)	Henry Dworshak (Idaho)
John Stennis (Miss.)	Everett M. Dirksen (Ill.)
Lyndon B. Johnson (Texas)	Charles E. Potter (Mich.)
John O. Pastore (R.I.)	

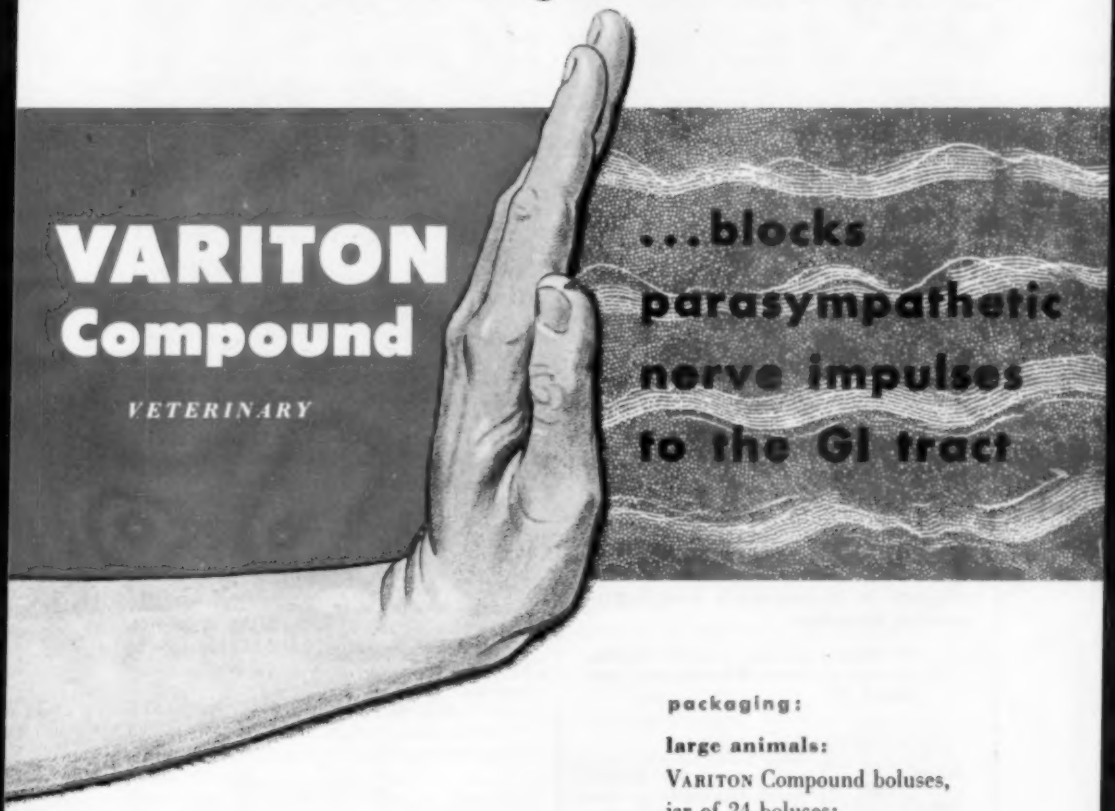
ARMED SERVICES

Democrats	Republicans
Richard B. Russell, Chr. (Ga.)	Styles Bridges (N.H.)
Harry Flood Byrd (Va.)	Leverett Saltonstall (Mass.)
Lyndon B. Johnson (Texas)	Ralph E. Flanders (Vt.)
Estes Kefauver (Tenn.)	Margaret C. Smith (Maine)
John Stennis (Miss.)	Francis Case (S. Dak.)
Stuart Symington (Mo.)	Prescott Bush (Conn.)
Henry M. Jackson (Wash.)	Frank A. Barrett (Wyo.)
Sam J. Ervin, Jr., (N. Car.)	

(Continued on p. 24)

double therapy

in diarrheas of animals, both anticholinergic and antibacterial



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the antibacterial, phthalylsulfacetamide, penetrates all layers of the intestinal wall for more effective treatment of enteric infections

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(*Continued from p. 22*)

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J. Allen Frear, Jr., (Del.)	Ralph E. Flanders (Vt.)
Russell B. Long (La.)	George W. Malone (Nev.)
George A. Smathers (Fla.)	Frank Carlson (Kan.)
Clinton P. Anderson (N. M.)	Wallace F. Bennett (Utah)
Paul H. Douglas (Ill.)	William E. Jenner (Ind.)
Albert Gore (Tenn.)	

INTERSTATE AND FOREIGN COMMERCE

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John O. Pastore (R.I.)	Andrew F. Schoeppel (Kan.)
A. S. Mike Monroney (Okla.)	John Marshall Butler (Md.)
George A. Smathers (Fla.)	Charles E. Potter (Mich.)
Price Daniel (Texas)	William A. Purtell (Conn.)
Alan Bible (Nev.)	Fred. G. Payne (Maine)
Strom Thurmond (S. Car.)	Norris Cotton (N.H.)
Frank J. Lausche (Ohio)	

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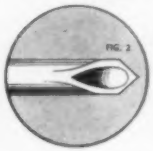

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W. Kerr Scott (N. Car.)	Thruston B. Morton (Ky.)
Richard L. Neuberger (Ore.)	
Frank Church (Idaho)	
Joseph S. Clark (Pa.)	

RULES AND ADMINISTRATION

Democrats	Republicans
Thom. C. Hennings, Jr. Chr. (Mo.)	Carl T. Curtis (Neb.)
Carl Hayden (Ariz.)	Joseph R. McCarthy (Wis.)
Theodore Francis Green (R.I.)	John Sherman Cooper (Ky.)
Mike Mansfield (Mont.)	Jacob K. Javits (N. Y.)
Herman E. Talmadge (Ga.)	

House Committees

AGRICULTURE

Democrats	Republicans
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W. R. Poage (Texas)	William S. Hill (Colo.)
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E. C. Gathings (Ark.)	Sid Simpson (Ill.)
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Democrats	Republicans
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(*Continued on p. 26*)

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(Continued on p. 34)

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The Student Loan Fund.—For a number of years, the Women's Auxiliary to the American Veterinary Medical Association has maintained a revolving Loan Fund from which loans may be made to needy and worthy veterinary students of accredited veterinary schools. The funds for this project have been generously donated by the women's auxiliaries of the United States and Canada, and by contributions to the Memorial Fund. Total contributions to the Loan Fund last year were $1,108.50, which is greatly appreciated.

The Loan Fund is administered by the Women's Auxiliary to the AVMA in accordance with regulations approved by the executive board and the house of representatives. At the San Antonio meeting, some changes in administration were adopted. At the present time, the second vice-president of the Auxiliary is responsible for keeping the records and notes of the loans, for the publicity, and the contacts with the applicants and the collection of the loans. All applications must be signed by the president and second vice-president of the Auxiliary. Our national treasurer acts as treasurer for the Loan Fund, writes and deposits all checks, and keeps a duplicate set of books and notes. Once a year, a record and the status of all outstanding loans is sent to the AVMA office in Chicago.

Loans are available to selected students; seniors are to receive preference, but juniors and graduate students (doing work in the fields of veterinary medicine) may be granted loans, if the balance of the fund remains above definite specified amounts.

The interest rate has been reduced from 4 per cent per annum to 2 per cent, and the maximum amount which may be borrowed has been raised from $400 to $500. The interest is due and payable on each anniversary of the note. Senior and graduate students are to repay the principal of $250 (if the loan is equal to, or more than, that amount) two years from the date of the note, and the remainder three years from the date of the note. Junior students are subject to payments of the same amounts, but have one year longer before payments of principal are due.

Approval of applications are subject to recommendation by two veterinary faculty members of the school which the applicant attends

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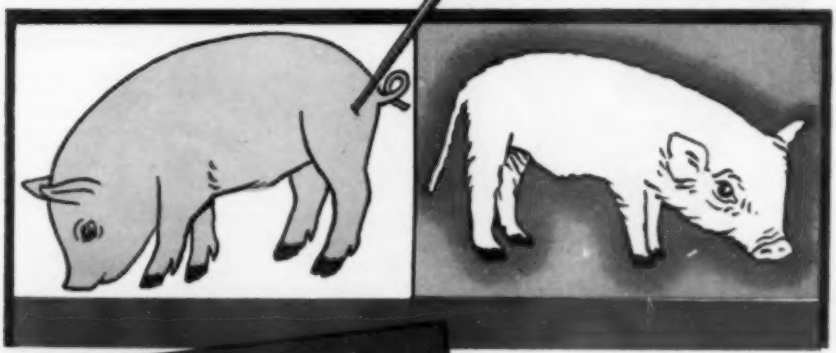

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Your Loan Fund has done, and is doing, yeoman service. Current requests indicate that it will continue to do so. If the expected number of requests for spring loans is received, our present funds will soon be exhausted. It is hoped that the loans coming due soon and your generous contributions will enable us to continue to grant low interest loans to needy and worthy veterinary students. We appreciate very much your past and continued support of the Loan and Memorial Funds, without which we would be unable to sponsor this worthy project.

s/(Mrs. E. E.) Freda Leasure,
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COMING MEETINGS

Minnesota State Veterinary Medical Association. Annual meeting. Radisson Hotel, Minneapolis, Feb. 4-6, 1957. B. S. Pomeroy, 1443 Raymond Ave., St. Paul 8, secretary.

Kansas Veterinary Medical Association. Annual meeting. Lamer Hotel, Salina, Feb. 6-8, 1957. K. Maynard Curts, 5236 Delmar Ave., Kansas City 3, Kan., secretary.

New Jersey, Veterinary Medical Association of. Annual meeting. Berkeley Carteret Hotel, Asbury Park, Feb. 13-14, 1957. J. R. Porteus, P. O. Box 938, Trenton 5, N. J., resident secretary.

Nevada State Veterinary Association. Annual meeting. Ranch Inn, Elko, Feb. 15-16, 1957. W. F. Fisher, 1465 Wells Ave., Reno, Nev., secretary.

Missouri Veterinary Medical Association, Annual meeting. Chase Hotel, St. Louis, Feb. 15-16, 1957. Paul L. Spencer, P. O. Box 283, Jefferson City, Mo., secretary.

Colorado A. & M. College. Annual conference for veterinarians. Colorado A. & M. College, Veterinary Hospital, Fort Collins, Feb. 18-20, 1957. O. R. Adams, head, Veterinary Clinics and Surgery.

Illinois State Veterinary Medical Association. Annual convention. La Salle Hotel, Chicago, Feb. 25-27, 1957. C. B. Hostetler, 1385 Whitcomb Ave., Des Plaines, Ill., executive secretary.

Alabama Veterinary Medical Association. Annual meeting. Lyons Hotel, Decatur, Ala., March 17-19, 1957. M. K. Heath, Alabama Polytechnic Institute, Auburn, secretary.

Washington, State College of. Annual conference for veterinarians. Pullman, Wash., April 8-10, 1957. Ray E. Watts, conference secretary.

Kansas State College. Conference for veterinarians. School of Veterinary Medicine, Manhattan, May 26-28, 1957. E. E. Leasure, dean.

Texas A. & M. College. Conference for veterinarians. Texas A. & M. College, College Station, June 6-7, 1957. R. D. Turk, chairman.

North Dakota Veterinary Medical Association. Annual meeting. Minot, N. Dak., June 17-18, 1957. Dean Flagg. 202 Teton Ave., Bismarck, N. Dak., secretary.

Canadian Veterinary Medical Association. Annual meeting. Vancouver, B.C., July 22-23, 1957. Claude Kealey, 1195 Wellington St., Ottawa 3, Ont., secretary.

Kentucky Veterinary Medical Association. Annual meeting. Brown Hotel, Louisville, July 15-16, 1957. Robert H. Singer, 136 Shawnee Place, Lexington, Ky.

American Veterinary Medical Association. Annual meeting. Hotel Cleveland, Cleveland, Ohio, Aug. 19-22, 1957. J. G. Hardenbergh, 600 S. Michigan Ave., Chicago 5, Ill., executive secretary.

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A permanent registry for canine "centenarians" is announced by the Gaines Dog Research Center, New York.

The registry will keep records on dogs 17 years and over—an age roughly equivalent to 100 in man. Essential vital data will be collected on each dog recorded, and this will serve as a continuing study that in time should yield valuable knowledge about the factors that make for longevity in dogs and perhaps also in man.

Persons owning or knowing of dogs 17 years of age and over are requested to send the information to the Gaines Dog Research Center, 250 Park Avenue, New York 17, N. Y.

new "far superior" treatment for retained placenta

Therapeutic failure, frequently encountered in retained placenta, can be prevented—with new FUREA Veterinary which combines the potent wide-range bactericidal and deodorizing action of FURACIN® (brand of nitrofurazone) with the cleansing action of urea. FUREA Veterinary boluses disintegrate readily and are nonirritating and nontoxic.

In retained placenta, treatment with FUREA has produced quick improvement of the general condition of the cow with lessening or elimination of malodor. Fertility rate remained unimpaired in over 90% of treated cows.*

SUPPLIED: Each bolus contains 0.12 grams of FURACIN and 12 grams urea. Bottle of 25.

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*Jones, S. V.; Balloff, G. B., and Roberts, H. D. B.: Vet. Med. 51:413 (Sept.) 1956.

For vaginal infections, including those caused by Vibrio fetus, that may prevent conception, or cause abortion, dispense: FURACIN Suppositories Veterinary, large. Box of 12.

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Regularly Scheduled Meetings

ALABAMA—Central Alabama Veterinary Association, the first Thursday of each month. B. M. Lauderdale, Montgomery, secretary.

Jefferson County Veterinary Medical Association, the second Thursday of each month. S. A. Price, 213 N. 15th St., Birmingham, secretary.

Mobile-Baldwin Veterinary Medical Association, the first Tuesday of each month. W. David Gross, 771 Holcombe Ave., Mobile, Ala., secretary.

ARIZONA—Central Arizona Veterinary Medical Association, the second Tuesday of each month. Keith T. Maddy, Phoenix, Ariz., secretary.

Southern Arizona Veterinary Medical Association, the third Wednesday of each month at 7:30 p.m. E. T. Anderson, Rt. 2. Box 697, Tucson, Ariz., secretary.

CALIFORNIA—Alameda Contra Costa Veterinary Medical Association, last Wednesday of each month. Leo Goldston, 3793 Broadway, Oakland 11, Calif., secretary.

Bay Counties Veterinary Medical Association, the second Tuesday of each month. E. Paul, Redwood City, Calif., secretary.

Central California Veterinary Medical Association, the fourth Tuesday of each month. R. B. Barsaleau, 2333 E. Mineral King, Visalia, Calif., secretary.

Kern County Veterinary Medical Association, the first Thursday evening of each month. A. L. Irwin, 301 Taft Highway, Bakersfield, Calif., secretary.

Mid-Coast Veterinary Medical Association, the first Thursday of every even month. W. H. Rockey, P. O. Box 121, San Luis Obispo, Calif., secretary.

Monterey Bay Area Veterinary Medical Association, the third Wednesday of each month. Lewis J. Campbell, 90 Corral de Tierra, Salinas, Calif., secretary.

North San Joaquin Valley Veterinary Medical Association, the fourth Wednesday of each month at the Hotel Covell, in Modesto, Calif. Lyle A. Baker, Turlock, Calif., secretary.

Orange Belt Veterinary Medical Association, the second Monday of each month. Chester A. Maeda, 766 E. Highland Ave., San Bernardino, Calif., secretary.

Orange County Veterinary Medical Association, the third Thursday of each month. Donald E. Lind, 2643 N. Main St., Santa Ana, Calif., secretary.

Peninsula Veterinary Medical Association, the third Monday of each month. T. D. Harris, San Mateo, Calif., secretary.

Redwood Empire Veterinary Medical Association, the third Thursday of each month. Robert E. Clark, Napa, Calif., secretary.

Sacramento Valley Veterinary Medical Association, the second Wednesday of each month. W. E. Steinmetz, 4227 Freeport Blvd., Sacramento, Calif., secretary.

San Diego County Veterinary Medical Association, the fourth Tuesday of each month. H. R. Rossoll, 1795 Moore St., San Diego, Calif., secretary.

San Fernando Valley Veterinary Medical Association, the second Friday of each month at the Casa Escobar Restaurant in Studio City. John Chudacoff, 7912 Sepulveda Blvd., Van Nuys, secretary.

Southern California Veterinary Medical Association, the last Wednesday of each month. Don Mahan, 1919 Wilshire Blvd., Los Angeles 57, Calif., executive secretary.

Tulare County Veterinarians, the second Thursday of each month. R. B. Barsaleau, 2333 E. Mineral King, Visalia, Calif., secretary.

COLORADO—Denver Area Veterinary Society, the fourth Tuesday of every month. Richard C. Tolley, 5060 S. Broadway St., Englewood, Colo., secretary.

Northern Colorado Veterinary Medical Society, the first Monday of each month. M. A. Hammarlund, School of Veterinary Medicine, Colorado A. & M. College, Fort Collins, Colo., secretary.

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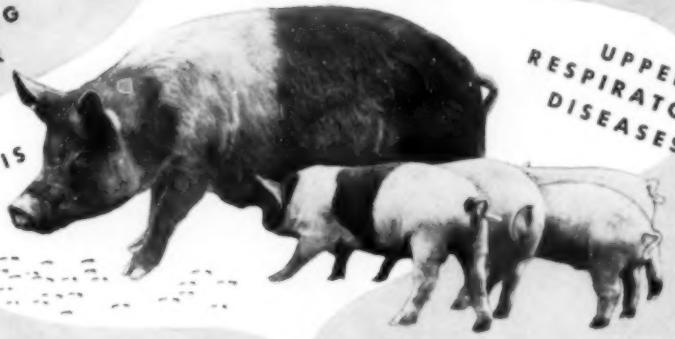

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Folic Acid	20 mcgs.
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3 *They get natural hormones—no alteration in normal carcass grade response*

HIGHER WEIGHT GAINS AT LOWER COST PER POUND OF GAIN. Synovex—today's first and only pellet implant developed exclusively for steers—contains two highly potent natural hormones, Progesterone and Estradiol Benzoate. Affecting the body's cells at the enzymatic level, Synovex exerts a marked physiological effect resulting in improved efficiency equaling up to 5c per pound of gain!

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Synovex contains only natural hormones and does not induce undesirable carcass characteristic changes which result in down-grading and lower price per pound.

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7 QUESTIONS YOU MAY BE ASKED ABOUT SYNOVEX...

HOW IS SYNOVEX ADMINISTERED? Synovex is prepared in a cartridge containing 6 pellets, or a total of one gram of Progesterone and 20 mg. of Estradiol Benzoate. Implantation is a simple procedure of nicking through the skin with a special scalpel, inserting the implanter and pressing a plunger to eject all six pellets. (If you do the implanting for your clients, you will find that with a good squeeze chute and crew you will have no difficulty averaging 100 head per hour.)

CAN LESS THAN THE ENTIRE CARTRIDGE (6 pellets) BE USED? No—The proper absorption rate is dependent upon the total surface area of the 6 pellets and must not be changed.

HOW SOON DOES SYNOVEX START TO WORK? . . . in minutes. Marked increase in appetite becomes noticeable within 7 days, and is maintained all during feeding period. Feed intake will be increased up to 5%. Increased rate of gain is prompt and can be demonstrated 30 days after implantation.

DO ALL WEIGHTS, GRADES AND AGES GAIN FASTER WITH SYNOVEX? Synovex is recommended for steers weighing from 400 to 1000 lbs., for use during last 60-150 days of finishing—one implant remains effective for entire finishing period.

WHAT EFFECT DOES SYNOVEX HAVE ON FEED EFFICIENCY? Tests in commercial feed lots have shown feed conversion improvement of 10-20%. Conversion ratios of 8.6:1 have been reported. In tests run under varying conditions, reported daily gains have varied from an additional .3 to .8 lb. per steer.

WHAT ARE THE ADVANTAGES OF THESE NATURAL HORMONES? They are inactivated in the body by the normal excretory mechanism prior to elimination. Carcass quality is unaffected.

HAS ANY STATE EXPERIMENT WORK BEEN DONE WITH PROGESTERONE-ESTRADIOL IMPLANTS? Yes, at Michigan State University.

NEW FOLDER ANSWERS 34 QUESTIONS ABOUT SYNOVEX. The 7 questions above are from Squibb's informative new *Question & Answer Folder*. Also contains tabulation of results of tests performed with Progesterone-Estradiol implants at Michigan State Experiment Station and under commercial feed lot conditions. For your free copy, write:

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• Synovex is available in 10-implant and 100-implant packages. Package containing implanter and knife is sold separately.

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Eugene J. McCarthy (Minn.)	
Frank Ikard (Texas)	
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(Continued from p. 32)

DELAWARE—New Castle County Veterinary Association, the first Tuesday of each month at 9:00 p.m. in the Hotel Rodney, Wilmington, Del. E. J. Hathaway, Clifton Park Manor, Apt. 73-5, Wilmington 2, Del., secretary.

FLORIDA—Central Florida Veterinary Medical Association, the second Friday of each month, time and place specified monthly. James B. Murphy, Eustis, Fla., secretary.

Jacksonville Veterinary Medical Association, the second Thursday of each month, time and place specified monthly. George F. Yopp, 4644 Main St., Jacksonville, Fla., secretary.

Northwest Florida Veterinary Medical Society, third Wednesday of each month, time and place specified monthly. Harold A. Tennant, Atmore, Ala., secretary.

Palm Beach Veterinary Society, the last Thursday of each month in the county office building at 810 Datura St., West Palm Beach. Ross E. Evans, 5215 S. Dixie Highway, West Palm Beach, Fla., secretary.

Ridge Veterinary Medical Association, the fourth Thursday of each month in Bartow, Fla. Paul J. Myers, Winter Haven, Fla., secretary.

South Florida Veterinary Society, the third Tuesday of each month, at the Seven Seas Restaurant, Miami, Fla. E. D. Stoddard, 6432 S. W. 8th St., Miami, Fla., secretary.

Suwannee Valley Veterinary Association, the third Friday of each month, at the Thomas Hotel, Gainesville, Fla. R. C. Mann, Rt. 1, Box 37, Ocala, Fla., secretary.

Volusia County Veterinary Medical Association, the fourth Thursday of each month. A. E. Hixon, 131 Mary St., Daytona Beach, Fla., secretary.

GEORGIA—Atlanta Veterinary Society, the second Tuesday of every month at the Elks Home on Peachtree St., Atlanta, Ga. J. L. Christopher, Smyrna, Ga., secretary.

ILLINOIS—Chicago Veterinary Medical Association, the second Tuesday of each month. Mark E. Davenport, Jr., 215 S. Edgewood Ave., LaGrange, Ill., secretary.

Eastern Illinois Veterinary Medical Association, the first Thursday of March, June, September, and December. A one-day clinic is held in May. H. S. Bryan, College of Veterinary Medicine, University of Illinois, Urbana, secretary.

INDIANA—Central Indiana Veterinary Medical Association, the second Wednesday of each month. Peter Johnson, Jr., 4410 N. Keystone Ave., Indianapolis 5, secretary.

Michiana Veterinary Medical Association, the second Thursday of every month except July and December, at the Hotel LaSalle, South Bend, Ind. J. M. Carter, 3421 S. Main St., Elkhart, Ind., secretary.

Tenth District Veterinary Medical Association, the third Thursday of each month. W. E. Sharp, Union City, Ind., secretary.

IOWA—Cedar Valley Veterinary Association, the second Monday of each month, except January, July, August, and October, at Black's Tea Room, Waterloo, Iowa. H. V. Henderson, Reinbeck, Iowa, secretary.

Coon Valley Veterinary Association, the second Wednesday of each month, September through May, at the Bradford Hotel, Storm Lake, Iowa. D. I. Lee, Sac City, Iowa, secretary.

Fayette County Veterinary Association, the third Tuesday of each month, except in July and August, at Pa and Ma's Restaurant, West Union, Iowa. Donald E. Moore, Box 178, Decorah, Iowa, secretary.

Northeast Iowa-Southern Minnesota Veterinary Association, the first Tuesday of February, May, August, and November at the Winneslick Hotel, Decorah, Iowa, 6:30 p.m. Donald E. Moore, Box 178, Decorah, Iowa, secretary.

KENTUCKY—Central Kentucky Veterinary Medical Association, the first Wednesday of each month. L. S. Shirrell, Versailles Rd., Frankfort, secretary.

Jefferson County Veterinary Society of Kentucky, Inc., the first Wednesday evening of each month in Louisville

or within a radius of 50 miles. W. E. Bewley, P.O. Box "H," Crestwood, secretary.

MARYLAND—Baltimore City Veterinary Medical Association, the second Thursday of each month, September through May (except December), at 9:00 p.m. at the Park Plaza Hotel, Charles and Madison St., Baltimore, Md. Harry L. Schultz, Jr., 9011 Harford Rd., Baltimore, Md., secretary.

MICHIGAN—Mid-State Veterinary Medical Association, the fourth Thursday of each month with the exception of November and December. Robert E. Kader, 5034 Armstrong Rd., Lansing 17, Mich., secretary.

Saginaw Valley Veterinary Medical Association, the last Wednesday of each month. S. Correll, Rt. 1, Midland, Mich., secretary.

Southeastern Veterinary Medical Association, the fourth Wednesday of every month, September through May. Gilbert Meyer, 14003 E. Seven Mile Rd., Detroit 5, Mich., secretary.

MISSOURI—Greater St. Louis Veterinary Medical Association, the first Friday of the month (except July and August) at the Sheraton Hotel, Spring Ave. and Lindell Blvd. Allen B. Shopmaker, 136 N. Meramec, Clayton 5, Mo., secretary.

Kansas City Small Animal Hospital Association, the first Monday of each month, at alternating hospitals. W. F. Noland, 7504 Metcalf, Overland Park, Kan., secretary.

Kansas City Veterinary Medical Association, the third Tuesday of each month at Exchange Hall, ninth floor, Livestock Exchange Bldg., 1600 Genessee St., Kansas City, Mo. Busch Meredith, 800 Woodswether Rd., Kansas City 5, Mo., secretary.

NEW JERSEY—Central New Jersey Veterinary Medical Association, the second Thursday of November, January, March, and May at Old Hights Inn, Hightstown, N. J. David C. Tudor, Cranbury, N. J., secretary.

Metropolitan New Jersey Veterinary Medical Association, the third Wednesday evening of each month from October through April at the Academy of Medicine, 91 Lincoln Park South, Newark, N. J. Myron S. Arlein, 2172 Milburn Ave., Maplewood, N. J., secretary.

Northern New Jersey Veterinary Association, the fourth Tuesday of each month at the Casa Mana in Teaneck. James R. Tanzola, Upper Saddle River, secretary.

Northwest Jersey Veterinary Society, the third Wednesday of every odd month. F. B. Duke, 49 Taylor St., High Bridge, N. J., secretary.

Southern New Jersey Veterinary Medical Association, the third Tuesday of each month at the Collingswood Veterinary Hospital, Collingswood. W. E. Snyder, E. Kings Highway and Munn Ave., Haddonfield, secretary.

NEW YORK—New York City, Inc., Veterinary Medical Association of, the first Wednesday of each month at the New York Academy of Sciences, 2 East 63rd St., New York City. C. E. DeCamp, 43 West 61st St., New York 23, N. Y., secretary.

Monroe County Veterinary Medical Association, the first Thursday of even-numbered months except August. Irwin Bircher, 50 University Ave., Rochester, N. Y., secretary.

NORTH CAROLINA—Central Carolina Veterinary Medical Association, the second Wednesday of each month at 7:00 p.m. in the O'Henry Hotel, Greensboro. Joseph A. Lombardo, 411 Woodlawn Ave., Greensboro, secretary.

Eastern North Carolina Veterinary Medical Association, the first Friday of each month. Wm. Allen Potts, 401 W. James St., Mount Olive, secretary.

Piedmont Veterinary Medical Association, the last Friday of each month. John G. Martin, Boone, N. Car., secretary.

OHIO—Cuyahoga County Veterinary Medical Association, the first Wednesday of each month, September through May (except January), at 9:00 p.m. at the Carter Hotel, Cleveland, Ohio. Ed. R. Jacobs, 5522 Pearl Rd., Cleveland, Ohio, secretary.

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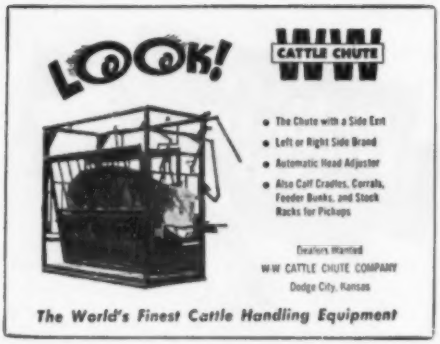
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OKLAHOMA—Oklahoma County Veterinary Medical Association, the second Wednesday of every month. James M. Brown, 2818 W. Britton Rd., Oklahoma City, secretary.

Tulsa Veterinary Medical Association, the third Thursday of each month in Directors' Parlor of the Brookside State Bank, Tulsa, Okla. Don L. Hohmann, 538 S. Madison St., Tulsa, Okla., secretary.

PENNSYLVANIA—Keystone Veterinary Medical Association, the fourth Wednesday of each month at the University of Pennsylvania School of Veterinary Medicine, 39th and Woodland Ave., Philadelphia 4, Pa. Raymond C. Snyder, 39th and Woodland Ave., Philadelphia 4, Pa., secretary.

SOUTH CAROLINA—Piedmont Veterinary Medical Association, the third Wednesday of each month at the Fairforest Hotel, Union, S. Car. Worth Lanier, York, S. Car., secretary.

TEXAS—Coastal Bend Veterinary Association, the second Wednesday of each month. J. Marvin Prewitt, 4141 Lexington Blvd., Corpus Christi, Texas, secretary.

VIRGINIA—Central Virginia Veterinarians' Association, the third Thursday of each month at the William Byrd Hotel in Richmond at 8:00 p.m. M. R. Levy, 312 W. Cary St., Richmond 20, Va., secretary.

Northern Virginia Veterinary Society, the second Wednesday of every third month. Meeting place announced by letter. H. C. Newman, Box 145, Merrifield, secretary.

Southwest Virginia Veterinary Medical Association, the first Thursday of each month. I. D. Wilson, Blacksburg, secretary.

WASHINGTON—Seattle Veterinary Medical Association, the third Tuesday of each month in the Trinity Episcopal Church, 8th and James St., Seattle, Wash. P. R. Des Rosiers, 5508 2nd Ave., N. W., Seattle 7, secretary.

South Puget Sound Veterinary Association, the second Thursday of each month except July and August. O. L. Bailey, P. O. Box 906, Olympia, Wash., secretary.

WEST VIRGINIA—Kyowva (Ky., Ohio, W. Va.) Veterinary Medical Association, the second Thursday of each month in the Hotel Prichard, Huntington, W. Va., at 8:30 p.m. Harry J. Fallon, 200 5th St., W. Huntington, W. Va., secretary.

WISCONSIN—Milwaukee Veterinary Medical Association, the third Tuesday of each month, at the Half-Way House, Blue Mound Rd. George F. Lynch, 201 West Devon St., Milwaukee 17, Wis., secretary.

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Veterinarian wanted to assist in active small animal practice conducted in modern hospital now staffed by 2 veterinarians in suburb of New York City. Address "Box A 28," c/o JOURNAL of the AVMA.

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Veterinarian wanted for general practice in Wisconsin; $450 per month starting salary, plus mileage. Can lead to profit-sharing basis. Address "Box B 33," c/o JOURNAL of the AVMA.

Young veterinarian, preferably single, wanted as assistant in mixed practice in central Iowa. Indefinite period of time, at least one year; possibility of permanent arrangement. State experience, school, references, salary desired, and age. Address "Box B 37," c/o JOURNAL of the AVMA.

Veterinarian wanted to manage or to lease modern small animal hospital. Oklahoma license required. Address "Box B 39," c/o JOURNAL of the AVMA.

Veterinarian desired for station veterinarian position North Carolina State College. Service obligation is veterinary care of college herds. Graduate study opportunity leading to M.S. degree. Position pays $5,400 per annum. Address Dr. E. G. Batte, Box 5658, State College Station, Raleigh, N.C.

Veterinarian wanted as assistant in small animal practice in mideastern state. Completely professional duties; 5-day week. Two-bedroom home 3 miles from hospital; pension plan; family health and accident insurance; excellent salary. Address "Box B 43," c/o JOURNAL of the AVMA.

Veterinarian wanted as assistant in mixed practice in northern Illinois; new hospital. Good starting salary; opportunity for partnership in the future. State full particulars. Address "Box B 41," c/o JOURNAL of the AVMA.

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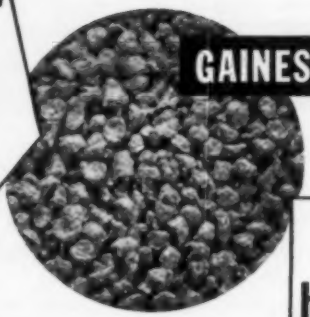

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Wanted—Positions

Graduate, 1954, desires position in small animal practice in New York City or vicinity. Single, 28; recently discharged from service. Address "Box B 25," c/o JOURNAL of the AVMA.

Young, married veterinarian receiving M.S. degree (work in avian hematology) in June wishes industrial or institutional position, the latter preferably with Ph.D. possibilities. Address "Box B 47," c/o JOURNAL of the AVMA.

Young, ambitious, married veterinarian interested in securing position as partner or assistant to a small or large animal practitioner. Address "Box B 29," c/o JOURNAL of the AVMA.

Graduate, 1955, desires position in busy small animal practice in New York, New Jersey, Connecticut area. Address "Box B 30," c/o JOURNAL of the AVMA.

Veterinarian, 30, 4 years of experience in own large animal practice desires association in busy mixed practice, including poultry and small animals. Would consider predominantly small animal practice. Address "Box B 27," c/o JOURNAL of the AVMA.

Graduate, 1955, desires position in busy small animal practice in southern California or San Francisco area. Address "Box B 31," c/o JOURNAL of the AVMA.

Experienced and competent veterinarian available for relief work or as temporary assistant in southeastern New York or southwestern Connecticut. Licensed in New York and Connecticut. Address "Box B 32," c/o JOURNAL of the AVMA.

Graduate veterinarian, 28, desires position with future in general or large animal practice in California; 2 years of experience. Have state license; available immediately. Address "Box B 35," c/o JOURNAL of the AVMA.

Graduate, 1954, desires position in mixed practice; licensed in California, Minnesota, Wisconsin; will consider any area. Married, 27; separate from service, July, 1957. Address "Box B 36," c/o JOURNAL of the AVMA.

Capable equine and bovine practitioner, 22 years of experience, age 43, 10 years present location, interested in partnership or association, central to southern Florida. Address "Box B 42," c/o JOURNAL of the AVMA.

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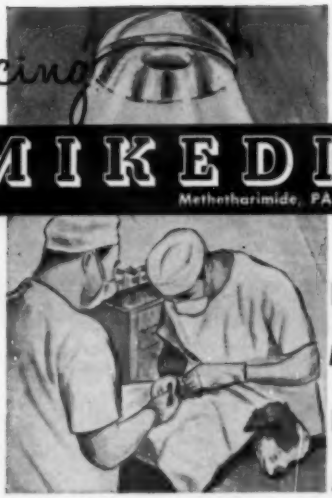

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There has long been a need for a highly selective, effective and prompt acting barbiturate antagonist which could be used safely and routinely, particularly in emergency states, to reverse the barbiturate action. Such a need is now fulfilled by *Mikedimide*, a clinically proven new drug which exerts its antagonism on almost all types of barbiturates.

Mikedimide acts promptly to increase respiration, restore reflexes and shorten sleeping time.

Mikedimide has a high therapeutic index, and no signs of toxicity have been observed. Animals can be put to sleep or awakened almost at will, by the alternate use of barbiturate and *Mikedimide* without any apparent harm to the animal.

We present below abstracts of a few typical case reports pertaining to the use of *Mikedimide*:

Morphine sulfate (0.5 gr.) was administered subcutaneously and 3 cc. (180 mg.) of pento barbital sodium was given intravenously to a deep surgical plane. The subject suddenly ceased breathing. The heart was weak and reflexes were absent. Two and one-half minutes after respiratory arrest, 105 mg. of *Mikedimide* was given slowly intravenously. The amplitude of respiratory movements markedly increased. Reflexes returned within one and one-half minutes. The operation and recovery were uneventful. The sleeping time was shortened about two hours.

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investigators report

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Now, for calf scours, "the nation's top calf killer . . ."[1] a new specific: safe, rapid-acting ENTEFUR. Highly effective, ENTEFUR produced cure rates of 93-95% compared to only 12-13% recovery in untreated controls in clinical trials.[2,3]

Investigators state: "Even calves with very bloody feces and moribund aspect when first seen made . . . a surprisingly rapid and complete recovery."[3] Beneficial effects are often obvious in the first 12 hours of treatment, with complete recovery after only 3 or 4 doses.[2] Calves raised on milk-substitute show a recovery rate on ENTEFUR comparable to that of nursing calves. No toxic effects have been demonstrated during administration of higher than therapeutic doses for prolonged periods.[2] Bacterial resistance does not tend to develop during treatment with the *nitrofurans* and has not been demonstrated in vitro or in vivo with ENTEFUR.

Each ENTEFUR Bolus, Veterinary, small, contains Furamazone® (brand of nifuraldezone) 1 Gm.—a new *nitrofuran*, selected for its specific bactericidal action against enteric bacteria including the virulent strains of E. coli found in calf enteritis—and bismuth subsalicylate 0.26 Gm. for its mildly astringent, antidiarrheal action.

DOSAGE: 1 ENTEFUR Bolus Veterinary, small, for each 150 lbs. body weight, or less, twice daily for 2 or 3 days. In most cases, 4 doses are sufficient for full recovery.

REFERENCES: 1. Segard, C.P.: Farmer's Digest, May, 1955. 2. Henry, R. T., and Blackburn, E. G.: Vet. Med., in press. 3. Bull, W. S.: N. Amer. Vet., in press.

SUPPLIED:
ENTEFUR Boluses Veterinary, small (3 Gm. each) are available in box containing 6 envelopes of 4 boluses each.

for calf enteritis

93-95% cures

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FURADANTIN is one of the nitrofurans—a unique class of antimicrobials, unrelated to antibiotics or sulfonamides. Like all the nitrofurans, FURADANTIN is bactericidal to a wide range of both gram-negative and gram-positive organisms. It is nontoxic to kidneys, liver and blood-forming organs. Development of bacterial resistance to FURADANTIN is negligible.

In canine tracheobronchitis (kennel cough), FURADANTIN stopped the cough in 11 of 12 dogs within 3 days. Within 1 week, all were fully recovered. There were no recurrences.[1]

1. Mosier, J. E.: Vet. M. 50:605, 1955. 2. Brackey, R. S.; Holt, S. H., and Siegel, D.: J. Michigan M. Soc. 54:803, 1955.

Dose: 1 to 2 mg. per lb. of body weight, 3 times daily, for 4 to 7 days.

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NITROFURANS—A NEW CLASS OF ANTIMICROBIALS —NEITHER ANTIBIOTICS NOR SULFONAMIDES

EATON LABORATORIES NORWICH, NEW YORK

Correspondence

Letters from Honorary Members Elected in 1956

Three distinguished scientists were elected to honorary AVMA membership by the House of Representatives at the 1956 annual meeting. They were Dr. C. L. Comar, chief of biomedical research at the Oak Ridge Institute of Nuclear Research, Oak Ridge, Tenn.; Dr. W. N. Plastridge, head of the department of animal diseases, University of Connecticut, Storrs; and Prof. Gaston Ramon, director of the Office of Epizootics, Paris, France.

Following are letters recently received from these men in which they express appreciation:

Dear Dr. Hardenbergh:

I am deeply appreciative and cognizant of the honor in being elected to honorary membership in the American Veterinary Medical Association.

In recent years it has been a source of gratification to note the increasing professional contributions and status arising from the activities of the American Veterinary Medical Association through its journals and meetings, and also through the efforts of individual veterinarians. I fully anticipate that the broad fields of biology and health will continue to benefit greatly from the interest and activities of members of the veterinary profession.

Sincerely yours,
s/C. L. Comar.

• • •

Dear Dr. Hardenbergh:

Honorary membership in the American Veterinary Medical Association is a singular honor which I deeply appreciate and shall always cherish.

I feel that the Executive Board and House of Representatives were most generous in their evaluation of my contributions to veterinary science, and extend my sincere thanks to them, and to you for your very kind letter of December 10.

With best wishes to you and the American Veterinary Medical Association.

Sincerely,
s/W. N. Plastridge.

• • •

Dear Dr. Hardenbergh:

I have the honor of confirming receipt of your letter of December 10, in which you inform me that the AVMA has elected me honorary member as evident in the diploma which accompanied the letter.

This high distinction, coming from the great American Veterinary Association, honors me infinitely.

It means to me not only a reward for my past efforts, but also a valuable encouragement to continue them to the best of my abilities, feeling most happy to be able to contribute thus to the reputation of our profession to which I have belonged for almost half a century.

(*Continued on p.* 48)

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product

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Works . . . with lower toxicity . . . where DDT, Chlordane and Lindane fail.

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Kills fleas in minutes—all ticks in a few hours. Lasting residual action.

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For kennel or home use. Kills fleas quickly, ticks overnight.

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Kills all fleas in 15 to 30 minutes. Non-toxic even on puppies or cats.

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Prove Malathion's effectiveness, send to Dept. JV for generous professional samples . . .

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5 doses (25 cc.)
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(2 vials Vaccine, 2 vials Sterile Diluent, 2 cc.)
ANTI-FELINE DISTEMPER SERUM: 10 cc.
CARICIDE® Diethylcarbamazine TABLETS:
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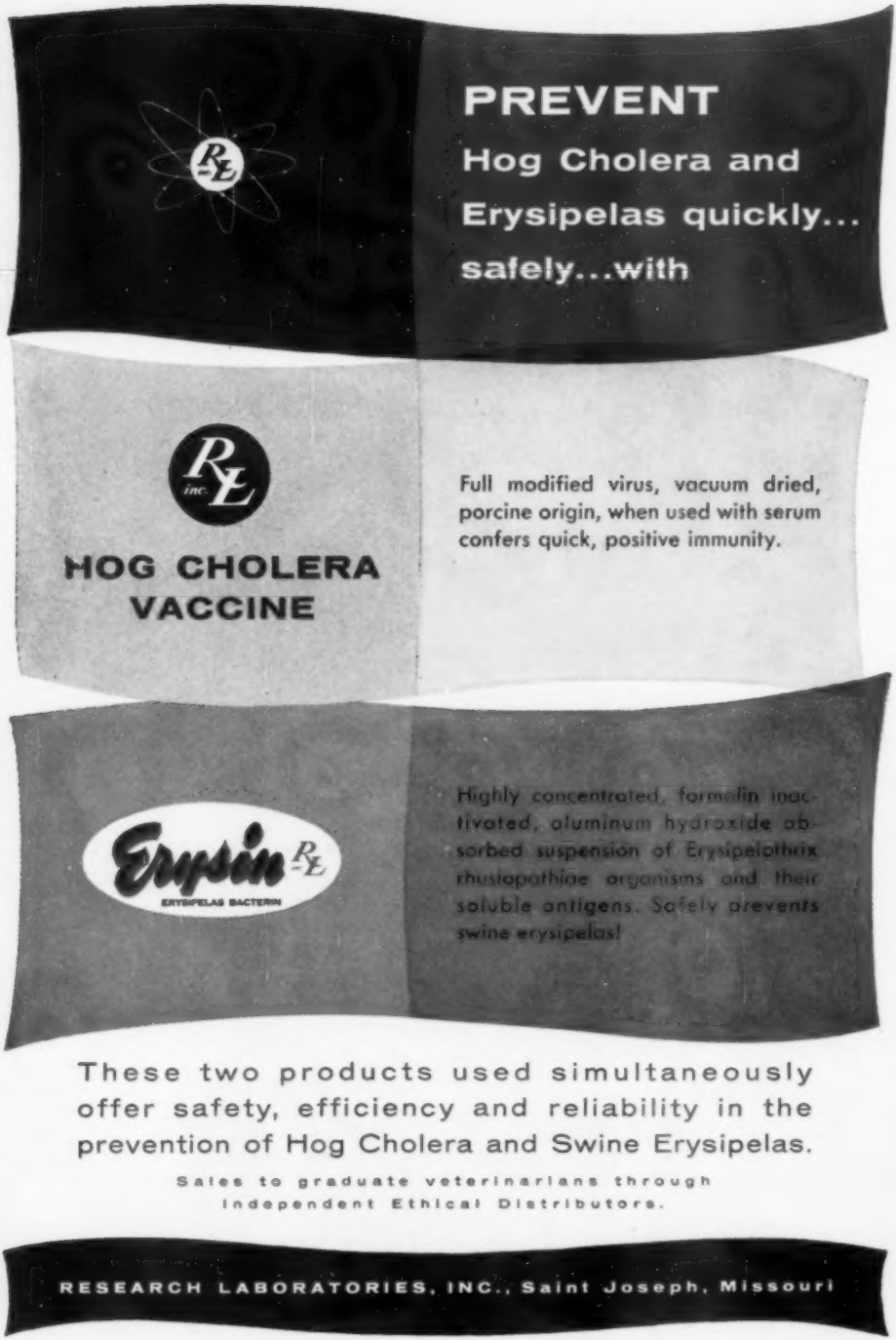
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in ketosis

the way it was

1945

"This continues to be an important problem to the veterinarian in dairy cattle practice. Some years ago, it appeared to be primarily a disturbance of such a nature that the body was unable to metabolize the fats—more carbohydrate was needed, more ready energy. Many cases responded to glucose intravenously, supported by the feeding of cane molasses or corn syrup. Others responded when chloral hydrate was administered, its effects being to liberate the glycogen stored in the liver.

"There were, however, cases which did not respond to treatment of this nature, but did improve markedly when anterior pituitary extract was injected. This still did not produce the desired result in all cases, and massive doses of vitamin A were administered. Results were spectacularly good in some cases, but dismally poor in others. When treatment can be accompanied by a change to new pasture, remarkable recoveries may be seen, but obstinate cases still occur in animals that are pasturing on lush green legumes.

"So the search for the underlying cause, and for a means of preventing or correcting the condition, still goes on."

Report of the Committee on Diseases of Dairy Cattle, R. C. Klussendorf, Chairman, J.A.V.M.A. *107*:355 (Nov.) 1945.

the way it is

1957

"There appears to be general agreement among those who have studied the disease [primary ketosis] that prompt stimulation of glycogenesis or glucose therapy constitutes the most effective treatment. . . .The satisfactory response of a high percentage of cows treated with 100 mg. prednisolone indicates that this is adequate dosage. Less severely affected cows may require only 50 mg. It is, therefore, effective in lower dosage than other presently available glucocorticoids recommended for treatment of ketosis."

Link, R. P.; Norton, D. L., and Reber, W. G.: Paper presented at 93rd Annual Meeting, A.V.M.A., Oct. 15-18, 1956, San Antonio, Texas.

STERANE

INTRAMUSCULAR

For prompt, efficient and economical treatment of bovine ketosis and other stress conditions.

Available in vials of 10 cc.; 10 mg. of prednisolone per cc.

Pfizer

Ask your Pfizer Distributor for information about the Pfizer Complete Medical Service

Department of Veterinary Medicine, PFIZER LABORATORIES, *Division, Chas. Pfizer & Co., Inc.*, Brooklyn 6, N.Y.

Recent graduate University of Pennsylvania desires position in a New England small animal or mixed practice with a future of partnership or purchase. Address "Box B 40," c/o JOURNAL of the AVMA.

German veterinarian, married, graduated Munich, 1951 (graduates of this year are recommended by AVMA for recognition by State Boards and other agencies), 5 years in own practice, well experienced in large and small animals; desires position in large animal or mixed practice. Available March, 1957. Address "Box B 44," c/o JOURNAL of the AVMA.

Wanted—Practices

Small animal practice wanted in Michigan or northern Ohio by experienced practitioner. Will consider purchase or lease with option. All replies confidential and answered. Address "Box B 1," c/o JOURNAL of the AVMA.

Mature, experienced small animal man must relocate in warm climate. Can purchase or will lease hospital in the deep south. Will consider a partnership or association in a practice. Address "Box B 26," c/o JOURNAL of the AVMA.

Veterinarian licensed in Alabama and Georgia wants either to lease small animal practice, work as assistant, or buy into partnership; married, age 33. Address "Box B 34," c/o JOURNAL of the AVMA.

For Sale or Lease—Practices

Clinic, less than 2 years old, for sale in fast growing west Texas town. Present practice good with unequalled future possibilities for the right man. Location is excellent now and gets better as the city grows. Room for enlarging if desired. Present practice is only 10% large animals but could be more if wanted. Other interests require selling; $6,000 and assume loan on building. Address Dr. W. H. Ponder, 1813 E. 8th St., Odessa, Texas.

Growing large animal practice for sale in Middlewest. Sale price includes appraised value of real estate; no drugs or equipment unless desired. Testing for brucellosis and vaccinating available. Address "Box B 28," c/o JOURNAL of the AVMA.

General practice for sale, northern Kansas county seat town; sale barn and slaughter house inspection. Average annual gross, $30,000. Cost of inventory, equipment, and real estate; some financing. Reason: I'm tired. Address "Box B 38," c/o JOURNAL of the AVMA.

Miscellaneous

Artificial Udder—Beco Litter Feeder—nurses 8 puppies simultaneously. Stays warm; easily cleaned and sterilized. Complete unit, $15; guaranteed. Breeders Equipment Co., Flourtown, Pa.

Breedersleve—the disposable obstetrical sleeve. Package of 25 with detachable chest band, $5.00; lower wholesale prices. Free sample upon request. Breeders Equipment Co., Flourtown, Pa.

Pregnancy diagnosis in mares—45th to 150th day. Request mailing tubes; $7.00, 2 or more, $6.00 each. Pregnancy Diagnostic Laboratories, Dysart, Iowa.

For sale—X-ray unit, like new, excellent condition; Profexray mobile unit. Ideal for veterinary practice and available at fraction of original cost. Address "Box B 45," c/o JOURNAL of the AVMA.

CORRESPONDENCE—*Continued from p. 43*

I beg of you to accept the expression of my profound gratitude, and to be kind enough to convey these feelings to your president and to my American colleagues, the members of your Association.

As a token of respect for the AVMA and yourself, I am sending you under separate cover abstracts of my most recent publications.

Please accept the assurance of my highest esteem.

Very sincerely yours,

s/G. Ramon.

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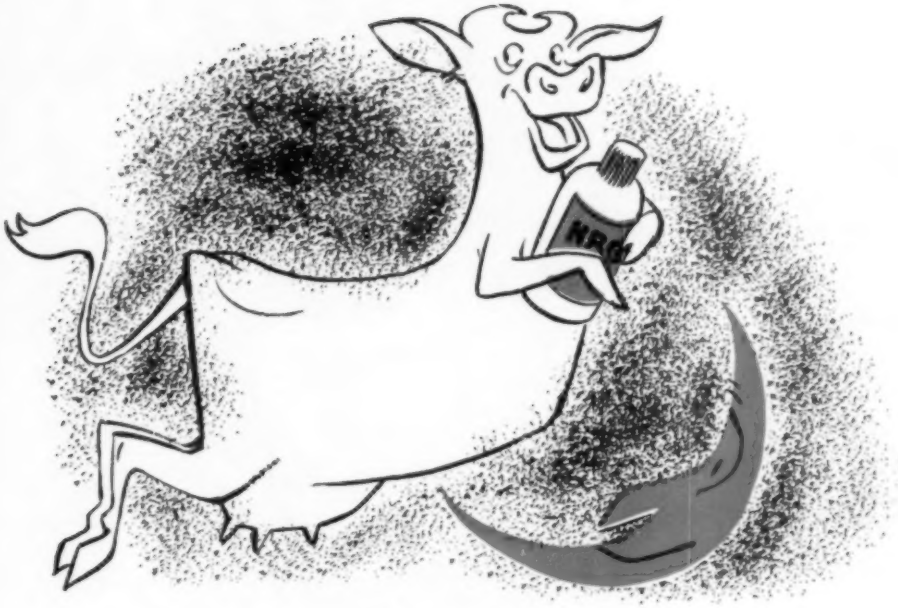

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Jen-Sal

new NEOCIDE* BOLUS provides total therapy for bacterial calf scours!

New Jen-Sal NEOCIDE boluses dissolve rapidly, releasing high levels of neomycin, electrolyte salts and kaolin for immediate three-way attack on the total problem of calf diarrhea.

Neomycin, outstanding intestinal antibiotic, is almost non-absorbable from the intestine. It controls gram-negative organisms responsible for much diarrhea in young animals, with virtually no danger of post-treatment drug resistant infection.

Electrolyte salts in proper ratio restore body cell chemistry to normal, reducing risk of circulatory collapse and sudden death.

Highly adsorbent kaolin slows down passage of vital fluids through the inflamed intestinal tract, and adsorbs toxic substances for more effective removal.

NEOCIDE'S practical price and convenient low dosage support dispensing needs. You and your clients will appreciate the economy, rapid action and total effectiveness of new NEOCIDE therapy. Order in packages of twenty boluses to be ready for the scouring season ahead.

*trade mark

reports received from premark dinical testing indicate the unique advantages of new NEOCIDE therapy

no other medication —
It was used on a calf from sale barn with scours and complications. No other medication was necessary.

recovery in half the time —
A farmer had 2 calves scouring. Neocide was given one, an antibiotic combination to the other. Neocid brought recovery in half the time o the other therapy.

other therapy failed —
The results were excellent . . . com plete . . . one calf had continu scouring several days even after r ceiving other therapy.

Jensen - Salsbery Laboratories, Inc.

Kansas City, Missouri